# China Europe Water Platform CE
# Business and Innovation Progra

# Conclusions and perspectives
# the 2019 activities of the Priori
# Market Segment:

## Industrial Water Use

## Including:

## Key results of

## EU China Water Development
## Forums in Chengdu and Qingda

This report summarises the discussions from the CEWP Business Program I held in November 2019 reg the Industrial Water Use Market Segment, and d Conclusions from all activities undertaken (Events plus Reports).

The report also presents a list of references for further information.

The report has been made as a Consultancy Service provided by In-Water, commissioned by the Danish Environmental Protection Agency as part of the PI Lot 5 Work Package 2, Business Program.

**Executive Summary:**

## 2019 Priority Market Segment: Industrial water use - Conclusions and Perspectives

In 2019, CEWP hosted four Business and Innovation Program Events and prepared/identified a number of background documents /1-5/ on industrial wa with the aim of helping European Companies in getting access to the signific Chinese Market for Industrial Water Technologies and of facilitating establish innovation-oriented relation-building between Chinese and European experts

The focus on Industrial Water Use started with two Information Meetings held Qingdao on April 12th and at the IE Expo in Shanghai on April 15th with more 200 participants from China and Europe, followed by the 14th EU-China EUP fair in Qingdao and Chengdu in November 11th-15th with more than 300 parti

### Conclusions

Based on the results of the activities it can be concluded that:

- Significant water scarcity hampers secure water supply to industries.
  Several industries are characterized by a potential to increase water u efficiency, among other due to weaker regulatory requirements and pr water and energy. Wastewater from industries has a potential to be fu treated among other due to very basic regulations or lack of enforcem regulations. Regulatory requirements- at national and provincial level will increasingly be strengthened in the coming years

- Significant upgrade of regulatory requirements.
  A number of legal and regulatory instruments at national and provinc will be fully enforced in the coming years like *Water Ten Action Plan* a *in China 2025* *(中国制造2025),* which stipulates that by 2025 th consumption per unit of industrial value added should be 41% lowe 2015, causing a rise in the demand for industrial wastewater treatm recycling systems.[1] At provincial level water quota and water standards are in the process of being strengthened.

- Industries faces significant policy risks.
  Regulations from water authorities only relates to water, while other fa energy efficiency, energy pricing and resource efficiency (circular eco as well as procurement and standards are left to other authorities to re For industries this gives difficulties and uncertainties in predicting polic changes, by industries known as policy risks. This makes decisions o

Altogether, the lack of cross-sector co-ordination leaves the industries significant policy risks.

- Market focus on "Buy Cheap" prevents "Buy Clever".
  Currently, the Chinese water technology markets are primarily domina low CAPEX as the key competition factor. Inevitably, this leads to long relatively high OPEX costs and high reinvestment needs, especially in context of increasing regulatory demands and increasing prices. There investments made following the low CAPEX approach may lead to low resilience to these changes and accordingly low long-term value.

- Digital Transformation is gaining momentum, but unevenly implemente
  Digital transformation has enormous potential for both improved efficie effectiveness and the Chinese IT sector is seeing this potential. Autho will gradually discover this and relate future regulatory requirements to possibilities for improving the environmental situation. For industrial production as well as wastewater treatment, digital transformation will substantial opportunities for improved management of production, act and asset management. Similarly, wastewater treatment plants will se significant opportunities following digital transformation.

- Tenders for B2G doesn't promote Technologies for the Future.
  In many cases, current tenders may not reflect these upcoming chang rather they are based on the solutions of yesterday. Tenders should b in co-operation with business partners, who are fully updated about th upcoming changes and opportunities – consultancy companies. It is questionable whether today's Design Institute can fulfill this role. Lack Financing constitutes a serious barrier for procurements focusing on l term value.

- Overall Conclusion: Current Market Functioning leads to short-term fo
  As a final conclusion the Chinese industrial water market can be cons quite conservative and driven mainly by regulatory requirement. Dema low cost technologies, which can comply with the regulatory requireme only to a limited extent by costs of resources (in particular water and e dominates the market requests.

**Perspectives for business and innovation**

The Events identified niches where European Companies may get access to significant Chinese Market for Industrial Water Technologies. Some niches a

- Water conservation, reclamation, water reuse and recirculation driven national and provincial level regulations. The market demands techno both for local industrial water reclamation and reuse within the industry and in larger water reclamation schemes. There may be a niche here decentralized reclamation schemes and technologies, as large centra systems are expensive due to the high piping costs.

- Industrial water pollution control in particular in Industrial parks. China relocating many of its industries like chemical and pharmaceutical indu into parks with the same type of industries. While the present regulatio quite basic there may be strengthened regulation of wastewater disch also including specific hazardous chemicals.

- Pre-treatment of industrial wastewater discharged to municipal wastew systems could be another niche. Heavy metals and hazardous chemic up in municipal sludge and prevents the reuse of sludge as fertilizer in agriculture- a procedure which is practices in many European countrie

- Digital transformation has enormous potential both for improving effici and effectiveness and the Chinese IT sector is seeing this potential, in technology transfer into the industrial water market, aiming on one ha document compliance with regulations in a longer perspective also in production costs and reuse resources within the industrial plant site.

- To be successful, EU Companies will have to find the niches in which expertise and premium technology are valued and there are clients wi financial resources to procure their services. If companies are doing it the opportunities will outweigh the challenges. Such niches could be e optimised sludge and wastewater treatment, resource reuse and indus parks water and wastewater technology and resource use.

- Doing it right means in selected niches requires and understanding of real clients and key partners are and which actions need to be taken a stage of the procurement process; from profile raising and intelligence gathering to positioning, partnering, tendering and the delivery of proje

<u>Long time perspectives</u>

- Climate change and increasing resource costs and circular economy w a large impact on a future industrial water market in China. European Companies will have an advantage as these drivers in addition to stro

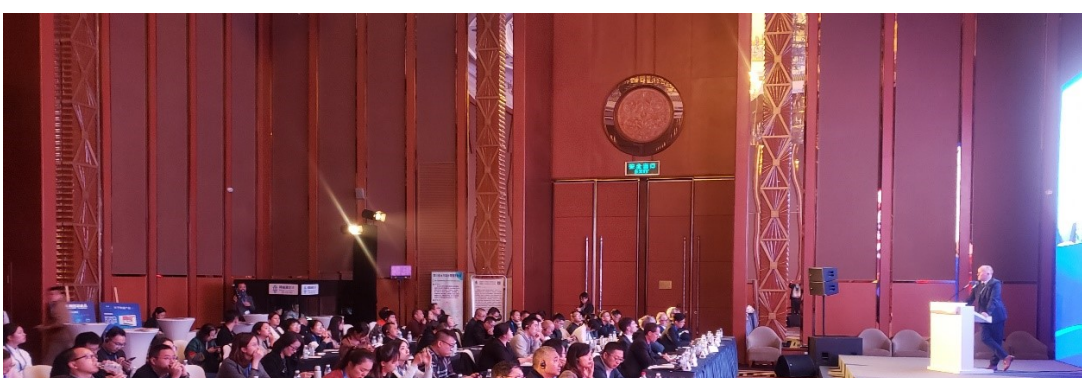
**Key results of the EU China Water Development Forum -CEWP Busines Innovation Programme 2019- Priority Market Segment: Industrial Water Crystal Hall, Chengdu Century City Conference Centre, 11th November 2 14.00-17.00 (see agenda and speakers in annex 1)**

**Summary:** The Forum attended by more than 150 participants from Europe, and international countries concluded that the Chinese industrial wastewater is definitively an area with business opportunities and that European technolo service providers have opportunities introducing engineering solutions that a Chinese plants to have a better industrial process, to save water consumptio reduce Operation and management daily costs. Capital expenditure on indus water and wastewater treatment in China is set to increase by nearly 25% ov next 3 years.

The Chinese industrial water market tends to be quite conservative sticking t proven technologies and the business case for investment in reuse and ener savings is often not good due to the present low water and energy prices. Th regulatory authorities are pushing ZLD (Zero Liquid Discharge) for certain typ industries and high-end decentralised sewage treatment

EU Companies will have to find the niches in which their expertise and premi technology are valued and there are clients with the financial resources to pr their services. If companies are doing it right, the opportunities will outweigh challenges. Such niches could be energy optimised sludge and waste water treatment, resource reuse and industrial parks water and wastewater techno resource use.

Doing it right means in selected niches requires and understanding of who th clients and key partners are and which actions need to be taken at which sta the procurement process; from profile raising and intelligence gathering to positioning, partnering, tendering and the delivery of projects



**Session one-challenges for Industrial Water Use, including re-use and wastewater management.**

**Henrik Dissing**, Head of the Business and Innovation component of CEWP introduced aim of the meeting to learn more about the industrial water use si in China, European innovations and technologies on industrial water use , Cl challenge owners water use problems and Chinese industrial water use technologies. He introduced regulation, circular economy, climate change an digitalization as game changers and key focus areas for the discussion.

Mrs Yao, Sichuan Academy for Water Conservancy informed that industries accounted for about 25% of the water allocated in Sichuan. Practices for wat savings and conservation have been ongoing in sectors like steel, textile, pap petroleum. A draft legislation to further strengthen industrial water conservati its way.

**Mr. Yuanchao Xu,** China Water Risk. CWR is a non-profit organization launc 2011 to foster efficient and responsible use of the China's water resources b engaging the global business and investment communities in understanding managing China's water risk. Mr. Xu informed that industrial and agricultural in China are the largest polluters, plus account for over 80% of national wate

Mr. Xu informed that 45% of Chinas GDP occurs in the 11 driest provinces. S industrial sector only create a limited economic output- however use significa amounts of water and discharge large volumes of polluted waste water. In th Yangze River basin 195 industrial parts has been relocated and 47 hazardou chemicals plants will be relocated by 2020

**Yong Xiaolei,** Chengdu Drainage Group informed about the increasing wate and activities to reclaim water and reuse this. This requires more intensive w treatment (like Membrane technologies) and Chengdu Env. Group is testing new plant. It also requires that industries pretreat the waste water discharged municipal waste water treatment systems. Presently 40% of the water discha reclaimed and used for industry, landscaping, washing vehicles and streets. are plans to develop a reclaimed water network for its distribution.

The panel discussion raised the following: difficulties in achieving the new inc water standards, reuse of industrial wastewater limited in Sichuan, low water does not promote reuse, pollution problems in the pharmaceutical sector nee addressed. On climate impacts the panel stressed the need of emergency pl and mitigation, precipitation models need improvement and climate change w impact drought and precipitation and lead to a need for more water reclamati reuse.

introducing engineering solutions that allow Chinese plants to have a better i process, to save water consumption, and reduce O&M daily costs. Capital expenditure on industrial water and wastewater treatment in China is set to i by nearly 25% over the next 3 years.

China wants to access best international practice that can be demonstrated t risk of loss into potential for growth, but there are many knowledge, language culture, IPR and financial barriers to overcome To be successful, EU Compa have to find the niches in which their expertise and premium technology are

Europeans have the ability to efficiently manage complex integrated systems can be very difficult to explain to Chinese clients. Therefore, Mr. Liam advice European companies to express themselves in simple terms.

**Zhou Haichuan,** Green Water IOT Founder informed about the role of digita in the water sector and the need to use IT solutions to integrate the various t data needed to design, implement, monitor and control integrated water management solutions. Green Water IOT already has a number of demonstr projects implemented and see a great future for this in the water sector.

**Dr. Palle Lindgaard-Jørgensen**, IN-Water informed about how pricing and s enforcement of waste water regulation has led to increases of industrial wate efficiency in Europe. Best Available Technologies has led to more efficient technologies, increased industrial water reuse both of process water and trea waste water. Much focus in China is on waste water treatment technologies environmental problems, while there is little focus in China on energy efficien treatment technologies and on resource efficiency and reuse of resources bo industries and in industrial parks..

While European companies are well known for their ability to deliver integrate solutions it may be difficult to sell in the market, as companies and tend to be conservative. Integrated thinking may still however be a selling point and differentiator for European companies. Also, digital transformation is expecte a game changer in the industrial water market in China.

**Professor Sumodip Sarkar** introduced open innovation as a model to devel products and services. He stressed the importance of problem owners and s providers to meet and discuss in the CEWP Business and Innovation progra meetings, as a basis for open innovation and business development.

**The Panel discussion of session two** focussing on digitalisation and soluti industrial water reuse stressed the need to find solutions for heavy metal rem but also that digitalisation may be used for reduction of costs (energy and lab

**Key results of EU China Development Forum -CEWP Business and Inno Programme 2019- Priority Market Segment: Industrial Water Use. Qingd International Conference Centre, Friday 15th November 2019 09:00-17:00 agenda and speakers in annex 2)**

**Summary:** The meeting attended by more than 150 participants from Chine European public, research and private sectors reviewed upcoming game cha for industrial water management, which will impact the market, state-of-the-a technologies and discussed perspectives for building Chinese-European coo clusters.

Shandong Province is a water stressed province and industries take up abou of the available water resources. The meeting considered integrated solution extended waste water treatment, increased reuse of water, use of alternative sources of water and improved resource and energy efficiencies as effective responses to the challenges. Policy initiatives on industrial regulation and pri resource uses, adopting best available technologies (BAT) and good housek and management practices as well as digital transformation techniques were as potential ways forward.

Perspectives for building Chinese-European cooperation clusters were identi sludge treatment with biogas production and reuse of resources, reuse of ind process and waste water, energy efficient waste water treatment, digital transformation solutions and sensor technology.

**Session 1. Challenges for Industrial Water use including reuse and was management. How will this impact the market. Perspectives for Innovat**

**Guo Xinshi,** Deputy Director of Qingdao Water Administration Bureau in his welcome note addressed the importance of the EU and China dialogue in CE informed that Qingdao has water scarcity due to low rainfall and that water e and water pollution were important topics for the CEWP dialogue.

**Segree Dai,** Director of EUPIC informed the participants of the role of EUPIC the cooperation up to now with CEWP.

**Henrik Dissing**, Head of the Business and Innovation component of CEWP introduced the theme of the meeting: Industrial water use as the topic for the activities in 2019. The aim of the present meeting is to learn more about the industrial water use situation in China, European innovations and technologie industrial water use, Chinese challenge owners water use problems and Chi industrial water use technologies. The results of the CEWP April meetings re a number of important topics for further discussion and detailing the challeng (i) sludge treatment and biogasproduction and reuse of sludge in agriculture reuse of resources (water, energy and nutrients) (iii) reuse of process waste (iv) energy efficiency/resource recovery and the opportunity area of digital transformation.

**Mrs Guo Xuwei,** Water Resources Institute of Shandong Province addresse serious current water resource situation in the province due to low rainfall an water resource storages. Industries account for 40% of the water use in the p Industrial water efficiency has increased in some companies and industrial w water treatment has been upgraded. The use of unconventional water resou desalinated water and rainwater and reuse of water has increasedThe price is low so there is a limited incentive to invest in reuse technologies. 500 out c companies has been listed as water conservation industries. A few is also lis the national list. Priority areas to focus on were improved control of water use new technologies, management of water use and resources, potential of Zer discharges from industries. Mrs Xuwei also informed that as an element of th implementation of the National Saving Action Plan to promote economic development in Shandong province, the province has developed a draft wate legislation. This included a.o. new water tariffs, water tax and. In 2020 there be amendment in which industries with a high water use would have increasi water tariffs and water monitoring. Also the province has developed water sa information campaigns for e.g. schools.

Mr. Xu informed that 45% of Chinas GDP occurs in the 11 driest provinces. S industrial sector only creates a limited economic output- however use signific amounts of water and discharge large volumes of polluted waste water. In th Yangze River basin 195 industrial parts has been relocated and 47 hazardou chemicals plants will be relocated by 2020

**Mr. Yao Jingwei**, Yellow River Institute of Hydraulic Research of the Yellow Coservancy Commission, informed about a scenario model used in the basin assess economic outputs of future potential actions to be taken in He Tao Irr Scheme. The Model, jointly developed by the institute and COWI showed tha possible to assess effects of various actions and benefits of these.

**Dr.Feng Dexin,** Qingdao Institute of Bioenergy and Bioprocess Technology, Chinese Academy of Sciences informed about successful treatment of indust waste water for reuse. Various technologies is being applied like oxidation membrane bioreactor and adsorption technology. Often a combination of technologies should be applied to reach a sufficient quality of the reuse wate on high strength wastewater, high salinity waste water were presented..

**Dr. Bi Xuejun,** School of Environmental & Municipal Engineering, Qingdao University of Technology stressed the serious water situation with rising wate combined with lack of water and the need to improve management of waste and solid waste management. Priority areas mentioned by Dr. Bi Xuejun was classification of water, water quality differentiation, module-based treatment s Urban grey water is reused in some areas like parks.

**The panel** for session one concluded that (i) industrial water reuse however management systems and policy was lagging behind the technologies (ii) De systems supporting economic impact assessment of technologies and plans exist, however are not very popular and has limited application in China (iii) r is needed to develop, test and document new technologies like e.g. Zero Liq Discarge, electro chemical application. The panel discussed pros and cons o centralized and decentralized wastewater treatment- the latter being seen as benefit as it did not require the establishment of expensive piping infrastructu distribution.

**Session two- Marketing Functioning and Innovation Perspectives**

**Dr. Palle Lindgaard-Jørgensen**, IN-Water informed about how high price of combined with strong enforcement of waste water regulation has led to a ger increase of industrial water efficiency in Europe. Adopting Best Available Technologies will gradually improve the adoption of more efficient technologi increase industrial water reuse both of process water and treated waste wate

**Mrs Helen Ding** KSB Group a joint venture between Germany and Chinese presented integrated systems with energy saving and intelligent integrated s in waste water treatment. The benefit of the systems were the limited space by the systems and that systems could be designed according the the water treatment needs- e.g. corrosive and high solids waste water.

**Yan Wen, Drausy Germany,** showed examples of valve and pump systems how these were used in aeration of lake and river water systems to improve water and sediment quality. The system also reduces odor.

Liu Xiaying. Director of Natureherit Desigh and Consult B.V. presented ideas role of spatial planning and green investments to enhance both EU and Chin industrial water resources management.

Liu Na, Hainext.Technical expert of Overseas Environmental Services, inform about their technologies comprising membrane systems and oxidation syste designed to treat wastewater with a high content of suspended solids. They specific systems for industries combining various technologies.

Mr. Li Zhiwai, Senior R&D Engineer of Qingdao Spring Water Treatment, a p sector company, specializing in sewage/sludge treatment. Spring offers serv consulting, R&D, design, implementation, investment and operation manage Mr. Liu Shu presented their moving bed biofilter, and their activities in retrofit waste water treatment systems and membrane bioreactor system (MBBR ty showed examples on how the system could achieve high-efficient treatment wastewater, achieve energy efficiency and solve sludge treatment problems

**The Panel of session 2** upon a presentation of the Open Innovation concep Soumodip Sakhar discussed the potential of cooperation between Chinese a European partners. The following topics were seen as having a potential for cooperation: energy efficiency, sustainable energy. The Chinese panel partic raised concern potential high prices of European technology.

References:

/1/ Key Results of the CEWP information meetings on Industrial water use in Qingdao and Shanghai, April, 2019 https://cewp.eu/information-meetings-qingdai-a expo-shanghai-april-2019

/2/ Piano Project The Chinese water market https://cewp.eu/sites/default/files/files/The-water-market-in-China.pdf

/3/ An introduction to the Chinese Water Tech Market. https://www.slideshare.net/EIP-Water/china-euwaterplatform-chinaworldssinglelargestmarketin2016

/4/ Market Situation in Europe. Industrial waste water report https://cewp.eu/sites/default/files/files/event%20files/Industrial%20Wastewate eport_(6th%20September%202019).pdf

/5/ Food sector waste water. Background Report CEWP Business and Innov Programme https://cewp.eu/sites/default/files/files/event%20files/Background%20docume CEWP%20P1%20Business%20and%20Innovation%20Programme%202019 ck%20of%20Industrial%20Water%20Efficiency.pdf

## Annexes

### Annex 1. Key results of the EU China Water Development Forum -CEWI Business and Innovation Programme 2019- Priority Market Segment: In Water Use. Crystal Hall, Chengdu Century City Conference Centre, 11th November 2019, 14.00-17.00

Draft Programme

**Session one – Challenges for Industrial Water Use, including re-use and wastewater mana how will this impact the market, perspectives for innovation**

14:00 – 14.10 Welcome remarks, Overview of the challenges facing the Water Sector and V using Industries during the coming 10 years and how this may impact the market, Henrik D CEWP

14.10 - 14.25 Water Saving Champions in the Industrial Sector,

Liu Shuangmei, President of Sichuan Adademy of Water Conservancy

14.25 - 14.40 Water Sector Challenges of the Yangtze River
Yuanchao Xu, China Water Risk

14.40 – 14.55 Industrial Waste Water Treatment in Chengdu
Chengdu Drainage Group

14.55-15.25 Panel Debate reg Game Changers for the Water Sector - Setting the scene for and opportunities; securing sustainable water management by regulation or technolo combination?

（Prof. ZHANG Kejiang, Director of high concentration industrial wastewater treatment co

sichuan water pollution treatment service association,will participate）

15.25-15.40 Teabreak

**Session two - European State of the Art Technologies**

15.40 – 15.55 Chinese Water Market, Co-operation Opportunities,

16.10-16.25 Water Technology Innovation in Europe,

Palle Lindgaard-Jørgensen, IN-Water

16:25-16:35 Open Innovation Meetings, introduction to the concept, Soumodip Sarkar, Uni
Evora, Portugal

16.35 – 16.50 Roundtable, Opportunities and Barriers for Market Development, Selecting t
challenges

16:50 - 17:00 Conclusions and next steps. CEWP Business and Innovation Program 2020, Up
Events, Henrik Dissing, CEWP

**Annex 2: EU China Development Forum -CEWP Business and Innovatio**
**Programme 2019- Priority Market Segment: Industrial Water Use. Qingd**
**International Conference Centre, Friday 15thNovember 2019 09:00-17:00**

# CEWP Business and Innovation Program

# EU China Water Development Forum

**Priority Market Segment: Industrial Water Use**

**November 15th, 09:00-17:00**

**Room 201 ,Qingdao International Conference Center**

**Session one – Challenges for Industrial Water Use, including re-use and wastewater mana**
**how will this impact the market, perspectives for innovation**

09:00 – 09.10 Overview of the challenges facing the Water Sector and Water-using Industri
the coming 10 years and how this may impact the market, Henrik Dissing, CEWP

09.10 - 09.15 Welcome remarks, Qingdao Water Administration Bureau

09.15 - 09.30 Industrial water use and water saving in Shandong province(tbd)
Guo Xuwei, Chief for Water Resources Department of Shandong Province

09.30 – 09.45 Water Sector Challenges of the China North Plain,
Xu Yuanchao, China Water Risk

09.45-10.00 Industrial Water Use and Wastewater Treatment
Bi Xuejun, School of Environmental & Municipal Engineering, Qingdao University of Techno

10.35 - 10.50 Tea Break

**Session two – Marketing Functioning and Innovation Perspectives**

10.50 - 11.15 Chinese Water Market, Cooperation Opportunities

Liam Jaczii, EU SME Centre

11.15 - 11.30 Water Technology Innovation in Europe,

Palle Lindgaard-Jørgensen, IN-Water

11.30 - 12.00 Roundtable, Opportunities and Barriers for Market Development, Selecting th
challenges; Setting the scene for Session 3 and 4

12.00 - 14.00 Lunch Break

**Session Three – Marketing Functioning and Innovation Perspectives**

14:00 - 14:15 Summarizing Session 1 and 2 findings

Henrik Dissing and Palle Lindgaard-Jørgensen, CEWP

14.15 – 14.45 European Innovative Technology Cases

KSB

Drausy

14.45 – 15.30 Chinese Innovative Technology Cases

Hainergy

Qingdao Spring Water Treatment

**Session Four – Open Innovation Meetings and Forming of Chinese European Cooperation**

15.45 – 16.15 Open Innovation Meeting, introduction to the concept,

Soumodip Sarkar, University of Evora, Portugal

16.15 – 16.50 Panel Discussion, Open Innovation Session

Discussion on Forming of Chinese European Cooperation Clusters

16.50 – 17.00 Conclusions and next steps. CEWP Business and Innovation Program 2020, U
Events, Henrik Dissing, CEWP