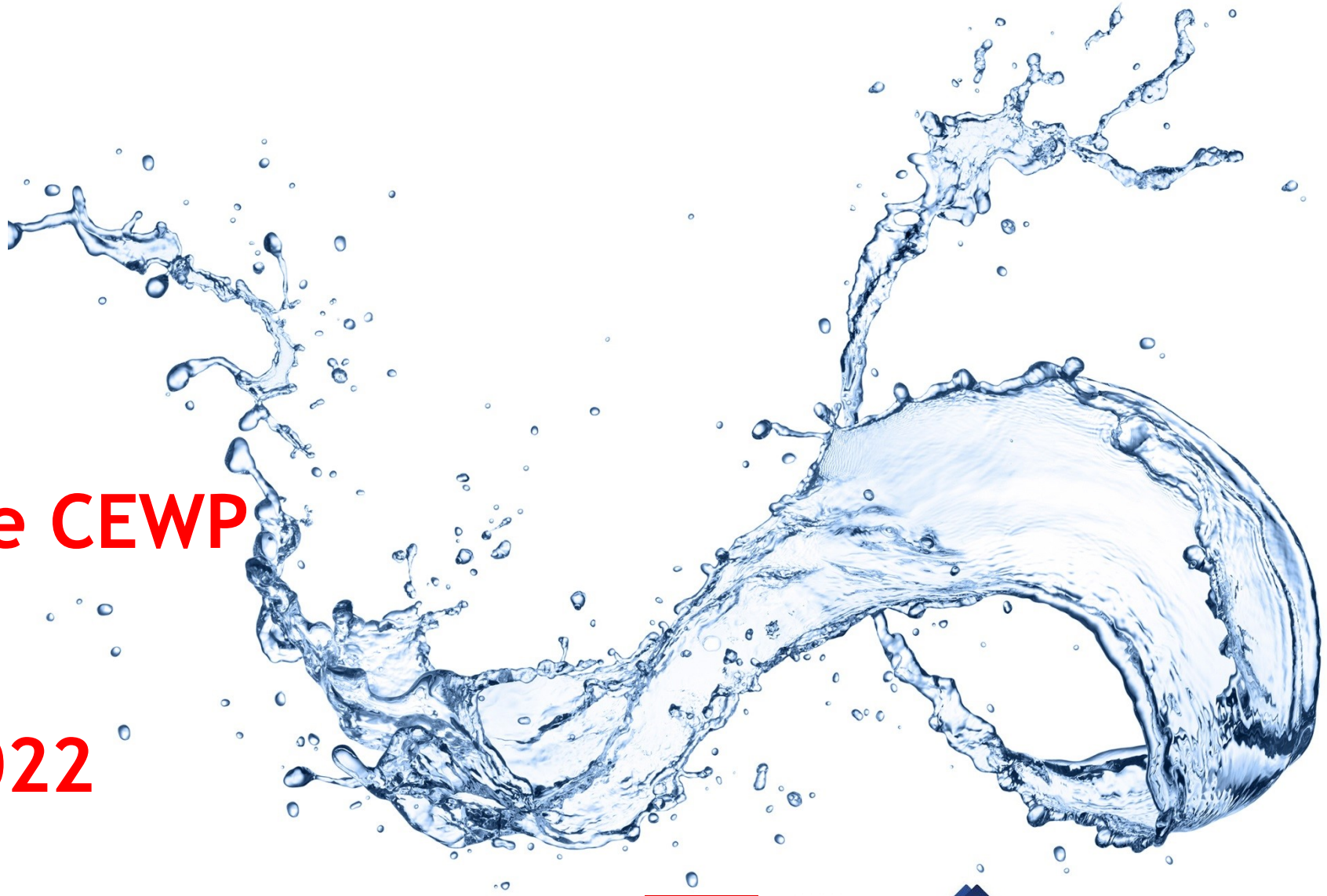
CHINA EUROPE Water Platform



Welcome to the CEWP Webinar Series

March 29th, 2022

CHINA EUROPE Water Platform www.cewp.org

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IWA the international water association

Program

CHINA EUROPE Water Platform

- 15:00/09:00 Welcome remarks - Henrik Dissing, CEWP
- 15:05/09:05 China Water Market and Technology Outlook Report 2021 – Henrik Dissing, CEWP
- 15:45/09:45 Roundtable
- 16:00/10:00 China IP SME Helpdesk: Project Introduction - Helika Jorgensen, IP SME Helpdisk
- 16:15/10:15 Looking forward to Aqautech Shanghai – Liam Jia, EU SME Centre
- 16:25/10:25 Closing remarks, next webinars - Henrik Dissing

China Water Market and Technology Outlook Report 2021

CHINA EUROPE Water Platform

- Market Expectations 2022-2026
- Technology Outlook and Market Niches
- Market Barriers
- Market Functioning
- Draft Policy Recommendations

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Roundtable participants

- Jingjing Ma, Nordiq Group
- Bruno Lhopiteau, Siveco
- Xiaojun Huang, Veolia
- Mads Terkelsen, Rambøll
- Li Ke, Danfoss
- Luca Bovo, Sommer

CHINA WATER AND TECHNOLOGY MARKET OUTLOOK

WEBINAR, MARCH 29TH, 2022

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CEWP – China Water Platform

CHINA EUROPE Water Platform

Launched @World Water Forum in Marseilles in 2012

Figure 1 Expert exchange between EU, Danish and DRC experts

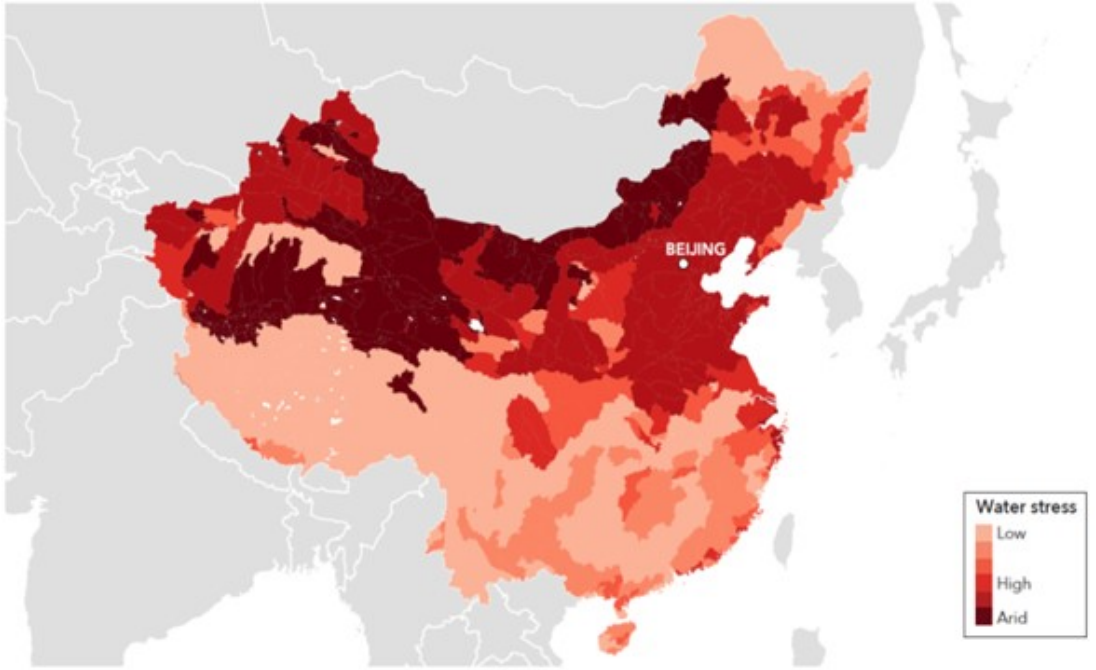
Figure 2 DRC President Yang Derui hands over China Water Development Report to GEUS Deputy Director Bjørn Kaare Jensen

Figure 3 Workshop at China Hall of Science and Technology

Figure 4 CEO Lars Schrøder, Aarhus Water, Denmark

China Water Challenges

- Experts project water supply will not be able to meet demands by 2030 if China carries on business as usual. 30 of 32 metropolitan cities have difficulties meeting water demands.
- 19% of the 7 rivers and basins and 35% of the 26 key lakes and reservoirs monitors are essentially useless for both agriculture and industrial use.
- Extremely high water stress, which means that 678 million people live in highly water-stressed areas.
- Groundwater magazines severely overexploited.



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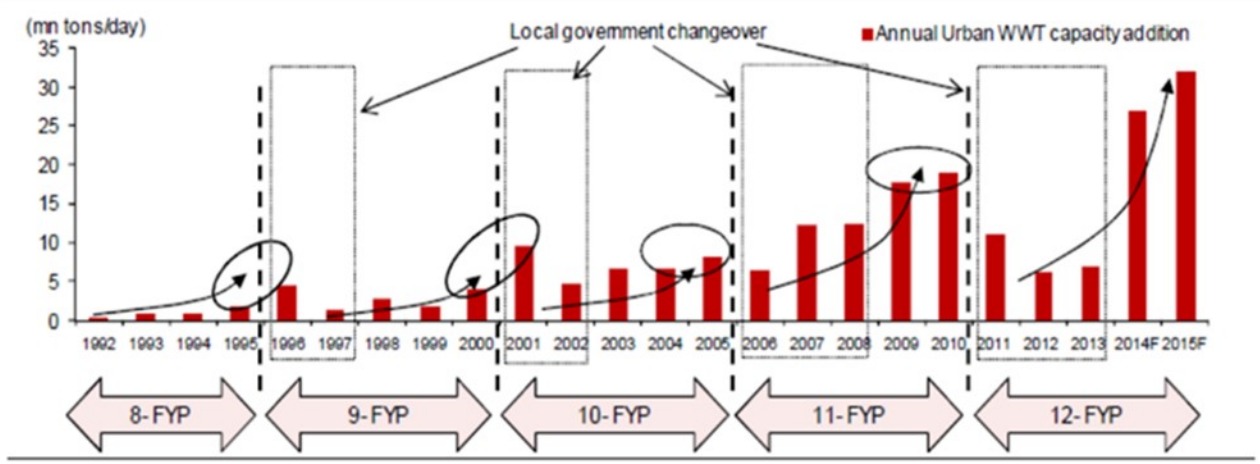
Agenda

- China Water Policy Drivers; 5 Year Plans; Action Plans eg. Water 10
- Market and Technology Outlook
- Barriers to the enter the market
- Enablers eg Digitalization
- Waternomics – framework conditions for key water Operators
- Policy Recommendations



CHINA Major Policy Drivers – The Policy Framework

- **Ecological Civilisation** – The overarching framework
- **State decrees and state level environmental Laws** – Provide legal framework
- **Five Year Plans** – provide priorities for investments and cross-sector planning
- **Action Plans** – provide sector specific programmes with investment levels
- **Ministerial Reorganisation** – 2018 reorganisation of Ministry for Ecology & Environment (MEE) and Ministry for Natural Resources (MNR)
- **PPP Finance and Regulation**
- **Party Cadre Performance assessments**

13th 5 Year plan

Main water sector targets of the 13th 5-Year Plan, covering 2015-2020 :

- Upgrade of municipal wastewater treatment
- New wastewater capacity
- Sludge management
- Wastewater reuse
- Installation of centralized wastewater treatment plants in all industrial parks
- All industries must meet the discharge standards in the 13th plan
- Cities to meet “Sponge Cities” Standards

Water and energy in 14th 5 Year Plan

Green Ecology	Reduction in energy consumption per unit of GDP (%)	--	--	[13.5]	Binding
	Reduction of carbon dioxide emissions per unit of GDP(%)	--	--	[18]	Binding
	Share of days with good air quality in cities at prefecture level and above (%)	87	87.5		Binding
	Share of surface water at or better than class III (%)	83.4	85		Binding
	Forest coverage rate (%)	23.2*	24.1		Binding
Security/ Safety	Comprehensive grain production capacity			>650mn. tons	Binding
	Comprehensive energy production capacity			>4.6bn. tons of coal equivalent	Binding

Major Policy Drivers – 14th Five Year Plan

- Out of 8 binding targets, 5 are green – 0 are economic
- Increasing focus on reuse of wastewater, water quality
- Further investments in wastewater, huge market growth
- Water Security Targets:

- Further promote industrial water saving and emission reduction
- Increase the utilization of unconventional water sources
- Promote comprehensive control of groundwater overexploitation: The overexploitation of groundwater in key areas such as Beijing-Tianjin-Hebei and Northeast China has been effectively curbed.
- Digitalization: Strengthen the construction of water safety monitoring system:

Market Expectations – Qianzhan IRI

Qianzhan Industry Research Institute:

Water sector Market Expectations – Mordor Intelligence

- The oil/water separation equipment is widely used in the oil and gas industry to separate oil and water, followed by the processing of oil to produce downstream products. Oil and water treatment industries are the largest segments that require the usage of gravity separators and hydro cyclones.
- Suspended solids' removal is a primary treatment process for wastewater treatment, where suspended solids and floating materials are effectively removed. Effluent is passed through various stages, to remove materials, such as wood pieces, plastic, paper, floating debris, metals, sand, clay, slit, ash, and other organic matter.
- Total dissolved solids (TDS) are the compounds left in the water after normal treatment and filtration. Drinking water contains hazardous chemicals from different water treatment plants. In such a situation, it is essential to use the proper filtration processes to remove the contaminants and make water safe for consumption.
- Biological treatment is an integral part of the wastewater treatment process. It treats the industry and municipality wastewater, which contains soluble organic impurities. This treatment technology uses organisms to breakdown the organic substances in wastewater, which includes the usage of nematodes, bacteria, and other small organisms.
- The high concentration of metals in water can affect plants, animals, and human beings, increasing the risk of skin and lung cancer, and possible effects on the nervous system. Thus, the elimination of these dissolved metals in industrial process water is imperative, before it is released or reused.
- *Other sources for an analysis of the key market players are Global Water Intelligence and Absolute Reports, all behind payment walls.*

Overall Technology Opportunities in the Chinese market

- **Water Treatment:** rising standards, investment via PPP, mature market
- **Industrial Water:** Efficiency gains, discharge reductions
- **Networks:** leakage detection, water quality monitoring, modelling
- **Desalination:** municipal market static, limited growth in last 5 years.
- **Wastewater Treatment:** rising standards, massive investment via PPP, mature market – integration to green infrastructure and ecology
- **Sludge Treatment:** Growing investment, developing regulatory framework, at take-off – integration to energy systems and solid waste management
- **Sponge Cities:** 16+14, moving beyond just pilots, the integration of Green infrastructure into urban planning and design was pioneered in Europe and is now being implemented on a massive scale in China

Industrial Water Use (2019) – Market Opportunities

- Clean Source: rising standards, investment via PPP, Mature market – Decentralised systems
- Reuse: Tightening regulation on water use efficiency. Developing infrastructure to market
- Wastewater Treatment: rising standards, massive investment via PPP, Mature market but much scope for further innovation.
- Coal to Chemicals – Massive scale, complex, ZLD requirement, 154 in Operation 69 in Construction (GWI)
- Industrial Parks
- Learn more: https://www.cewp.eu/sites/default/files/files/The-water-market-in-China.pdf

Urban Water / Sponge Cities / Wastewater Treatment (2020)

- Launch event, Aquatech Amsterdam, November 2019
- Webinar Series, Spring 2021 – Reports, PPTs, recordings
- Side-event, Aquatech Shanghai, June 2021
- Thematic Focus, Lot 3: Urban Water, Policy Dialogues, 2020-2021
- IWA World Congress, Copenhagen, September 2022

- Learn more: www.cewp.eu/waterurban

Rural Water (2022)

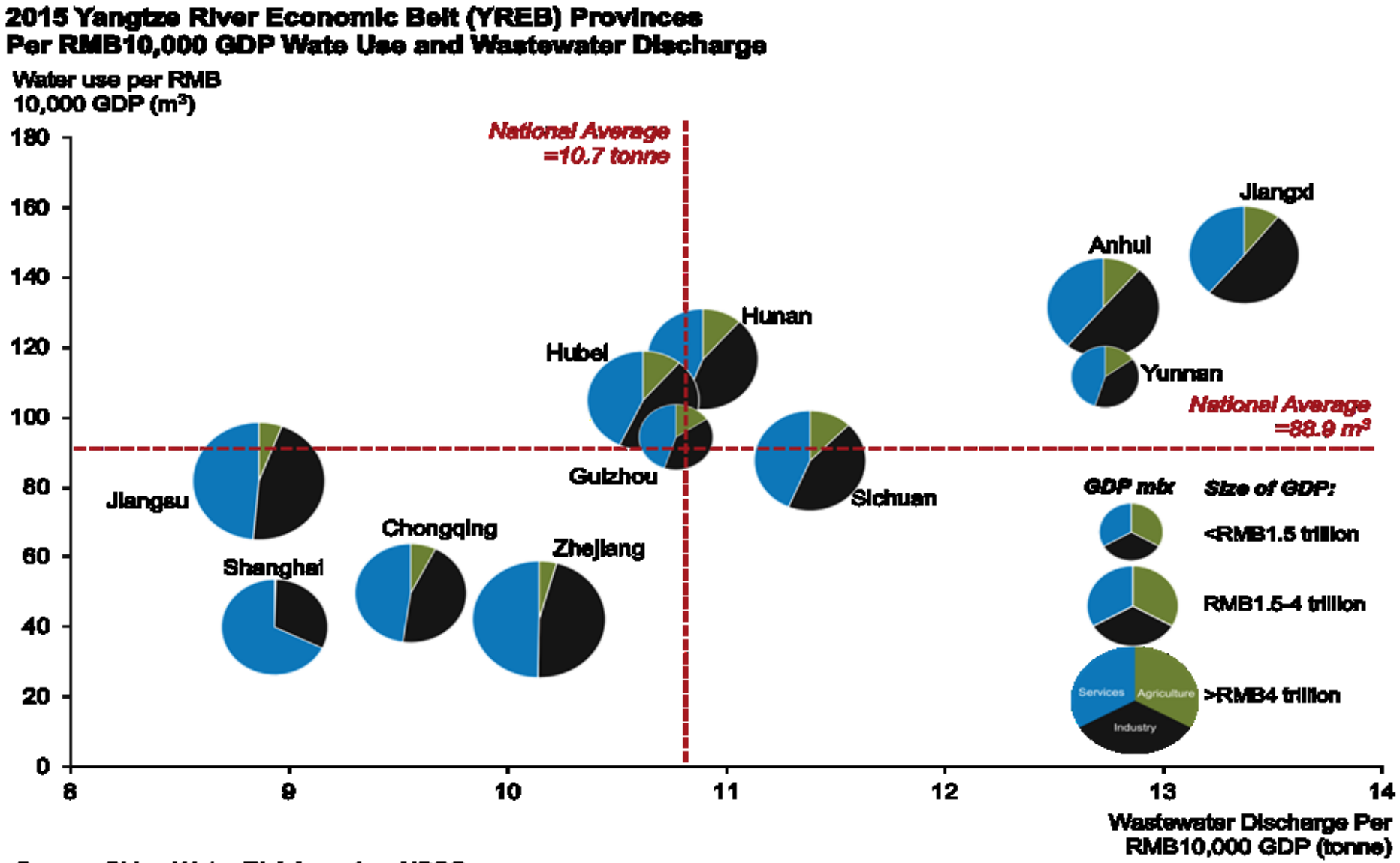
Topics:

- Agricultural Water Use: Irrigation, Nutrient management and budgeting
- Water Supply for Rural Cities and Villages
- Recycling Wastewater for Rural Cities and Villages
- Reducing surface and groundwater water pollution
- Groundwater Management, including Extraction, Monitoring, Protection against overdraft
- Water Quality Monitoring and Equipment
- Wetlands, Lakes and Rivers Restoration
- Water Networks
- Wastewater treatment (Decentral Management, Small Scale Solutions)
- Biological Wastewater Solutions
- Rural Water included water supply and wastewater in rural areas, smaller cities (Tier 4 and lower levels), water technologies for the Food Sector including Agriculture, wetlands restoration

Events:

- Webinar Series, April 19th and May 31st, 2022
- Side-event, Aquatech Shanghai, June 8th-10th, 2022
- MWR Water Tech Expo, Jiangxi, June 14th-16th, 2022
- IWA World Water Congress, September 11th-15th, 2022

Regional differences



Source: China Water Risk based on NBSC

Important definition – ”the Market”

- In this presentation, and in the related webinar reports as well as the CEWP Water Market and Technology Outlook Reports, “the Market” means the place and the way, that investments are turned into procurements.
- By using the terminology “the Market”, it is not implied, that a transition to a market-based water sector or economy as such is suggested.
- The use of the terminology “the Market” is to emphasize that any given transaction takes place according to certain rules and specifications, especially tenders formulated according to selected standards, and that these rules and specifications determines to which extent technical and economic factors are included. This has huge implications both for qualitative parameters, as well as for cross-cutting and cross-sector parameters.
- Further, also the framework conditions for the procurer (= the operator of the solutions) have influence on the transactions. If these conditions allows for true cost of ownership approach, it will also favor the most efficient solutions.

China: water sector market functioning - The Value Chain:

- *Drivers:* Public Policy Targets eg. via 5-Year Plans, Profit-driven decisions of private stakeholders eg. industries and utilities emphasizing Asset Management, or new technologies, eg. digitalization. Also, energy prices reflecting true cost of operations as well as an internalization of external, undesirable effects, eg. climate change.
- *Investments:* in the water sector typically originates from Government budgets, utilities or private sector. They follow different structural ways, in some cases the investor and the one actually spending the more is the same, eg. in industries, while in other cases, especially related to government budgets, the funds are distributed across eg. provinces, cities or utilities depending on the concrete case.
- *Procurements:* In the water sector, this is often via bidding procedures following certain rules. Importantly, at this stage the demands of the investor initially formulated in terms of targets is translated into a requirements specification based on one or several standards. Exactly this process of formulating the specifications constitute a stage, where the efficacy may lose value, eg. if the standards hasn't been revised according to either public policies or availability of state-of-the-art technologies, or if the standards only relates to a given sector, not taking into account eg. energy efficiency of water technologies.

Market Functioning #2

- *Operations:* Following procurements of any type of solutions, it is important to look into the use of these at the operational stage. Here, effectiveness of the investments may be reduced substantially, eg. if the competences of the staff of the operator are not sufficient, e.g. when procuding digital solutions without having digital competences at all relevant levels of the organization. Other examples include lack of incentives for the organization to effectively apply the solutions, eg. if economic incentives of a utility doesn't reward a utility to make full use of equipment related to reduction of non-revenue water (water leakage), due to that the utility itself are not allowed to keep increased incomes. Globally, it constitute a huge efficacy problem, if utilities don't have the right incentivized framework conditions in terms of a ring-fenced economy and the ability to get pricing right. Particularly important to mention is the importance of getting pricing right: energy costs have the potential to be a key driver for efficacy in the water sector, but this is lost if prices are substituted. Also, seriously important for having a strong value chain is the ability of a utility to implement a true-cost-of-ownership approach in its economic operations. This may be a key reason for not building sufficient interest on the operator side to procure state-of-the-art solutions with low, long term operational costs compared to the cost profile of bulk solutions.

- *Monitoring:* At the end of the day, not monitoring market efficiency and effectiveness of investments and initiatives implies a huge risk of budget resources spend not leading to a desirable effect profile to the investor. To public money spend this means long-term costs being unnecessarily high.

A well-functioning water sector Market may be characterizised by

A Well-functioning Market which:

- Ensures maximum value creation for society
- Favour long-term economic and environmental solutions
- Ensure technology transfer to contribute to adressing to the water challenges
- Facilitate entry of SMEs, as these often are the carriers of new, innovative solutions
- Reduce the carbon footprint of the water sector
- Reduce water loss and inefficient use of water resources
- Function without Market Barriers and Risks for companies

General Market Barriers

- Market understanding / language
- Market / public acceptance of new technologies
- Promoted / closed lists for imports and market access
- The Self-Sufficiency Concept
- Localisation of technology / understanding local standards
- Certification and approval of technologies, licences to operate or issue designs
- Identification of clients
- Procurement rules
- Business registration and banking
- Reliable partners for distribution, installation, training and operation
- Hiring of local staff or brining foreign experts to China
- IPR protection and copying
- Company resources, skills, financial capacity and china strategy

Market Barriers - Competition

- Only in niche and specialised areas can EU companies stand out. Major areas are blocked.
- SOE / Private sector companies are now fully established in the core markets. Little scope for EU business to directly engage in the main urban water business or to bid successfully against local players.
- Though it is rising, the low water price for water supplied and low rates for wastewater treatment provision remains a barrier to entry.
- The political means available to local companies to negotiate around low tariffs to get to extra payments is complex and sensitive and much more difficult to engage in for EU SMEs

Strategies to Overcome Barriers

- Understand the market and the procurement processes.
- Match to the needs and expectations of the clients.
- Map the revenue streams of the clients and the supply chain.
- Best chances of successful entry are in niche, emerging **or high-risk areas**.
- Keep the product simple. Express yourself in simple terms.
- Comply with local standards and market prices.
- Define a premium product that still offers good value.
- Have strategies to protect your IPR.
- Acquire knowledge of the financing options.
- Understand the reforms to the procurement regulations and the actions now available.
- Invest in building relationships with technical, business and financial partners and exercise due diligence.

Digitalization- an opportunity for the water sector

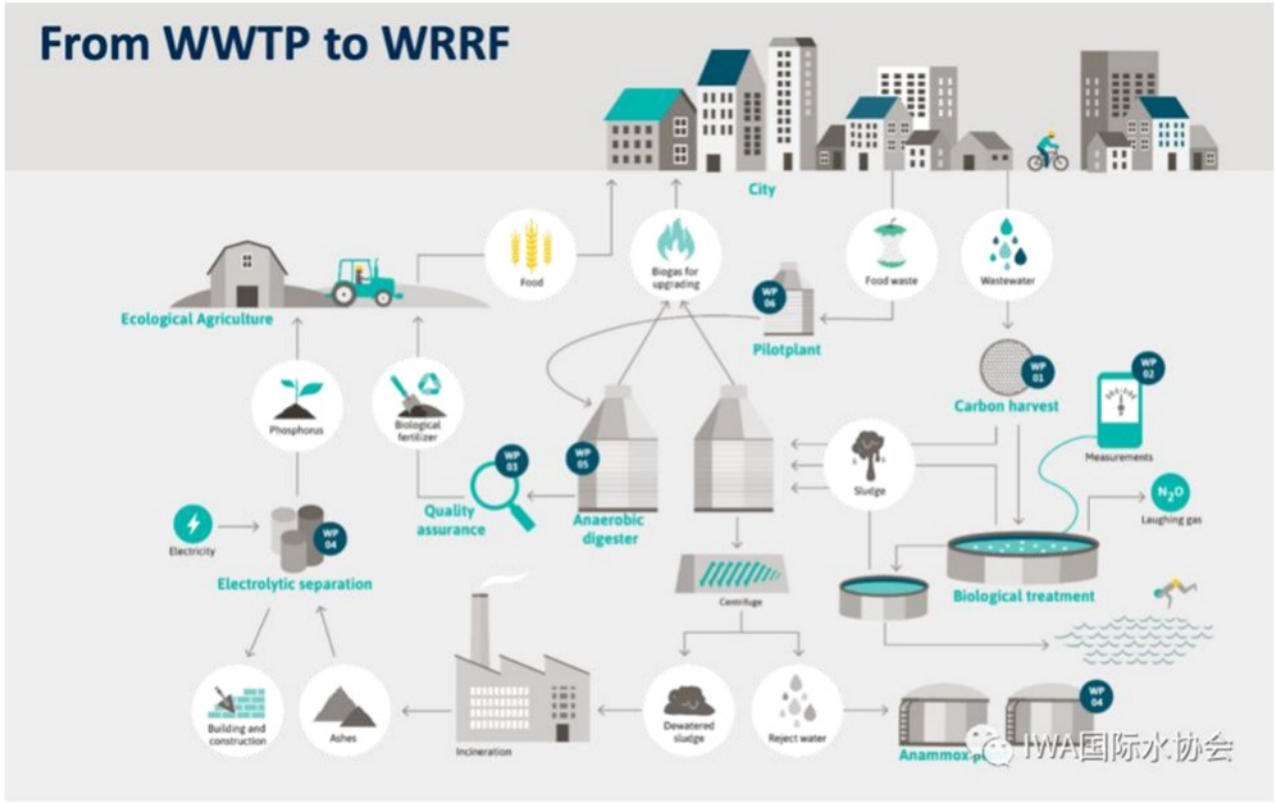
Digitalization technology is fast developing at all stages of the water management cycle including monitoring and metering systems of data, data collection systems, data management systems and intelligent information systems.

Procurement of digital water solutions may not be well specified in tenders. ISO 55000 and other related standards can be used to make the demand/requirements for the IT water solutions more precise.

Availability of sensors with a potential for real time monitoring is essential for fast management response both in e.g. flash flood early warning and management and in water quality and quantity protection and management. However, sensors (or other monitoring equipment) able to detect advanced, chemical parameters in real-time on-line are in most cases still to be innovated.

Value Creation: Do customers have the competences for digitalization?

Moving towards climate-neutrality- energy neutral/energy positiver waste water treatment



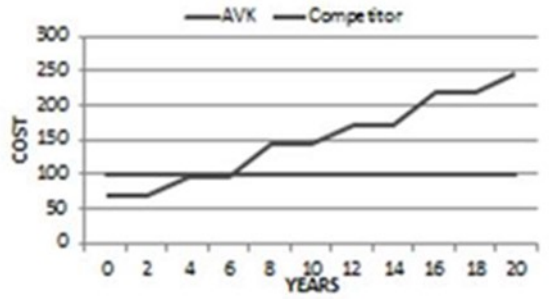
Circular Economy potential in the water sector

- *Circular economy-based solutions in the water sector have a big potential* and technologies are largely already available and the benefits in terms of water and resource savings and reduction of CHG´s has been demonstrated in many countries
- *Procurement of water and energy solutions may not be well specified in tenders.* Standards can be used to make the demand/requirements for the solutions more precise.
- *Investments in Energy savings, energy production from biogas and utilization of water borne energy may in some cases have short pay-back time*. Ring-fencing the economy of water and waste water organizations is a necessary condition for keeping the savings in their own organization. Also, in case a waste water treatment plan can be made energy positive, it should possible for water organizations to sell/provide their energy surplus to the energy network or other energy users.

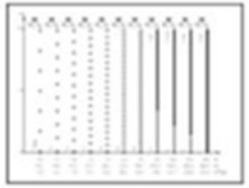
OPEX vs CAPEX - TOTEX

A low investment price may not be result in the lowest total cost over the lifetime of the technology

Cost of ownership



Activity	AVK	Competitor
Gate valve	100	75
Problem	0	500
Detection	0	500
Excavating	0	2000
New valve	0	75
Restore	0	2000
	100	5150



Expect... AVK

DRAFT Policy observations/recommendations

- The following DRAFT policy observations/recommendations are the result of the discussions during CEWP market and business seminars over the last 4 years.
- They will be subject to review, revision and reformulation during the 2022 activities of the Business Program.
- They will be presented to the CEWP Joint Steering Committee for approval before being forwarded to the Annual High-level Meeting 2022.
- Comments and suggestions are welcome hedis@mst.dk

DRAFT Policy observations/recommendations # 1

#1 Improve Technology Transfer to support Green Transition

A suggestion could be to select technologies / market segments which are of particular importance and carry out a "service check" of the entire value chain.

Also for this topic, a "service check" of the actual content of key standards should be examined, both for the technological requirements related to the water sector, but especially also requirements related to the energy efficiency of the products.

DRAFT Policy observations/recommendations # 2

- **#2 Increase Public Value Creation from investments in Water Sector**
- *A suggestion could be to review this framework for the public operators undertaking procurement of new technologies.*
- *A suggestion could be to review the incentives structures and operational framework conditions for utilities and other water sector operators seen in the context of securing long-term sustainability, both environmental and economic.*

DRAFT Policy observations/recommendations #3

- **#3 Reduce Carbon Footprint of the Water Sector**
- *A shift from a supply-side to a demand-side approach to water resources management is suggested.*
- *Altogether, a review of procurement procedures and standards within the scope of the entire water-food-nexus is suggested.*

DRAFT Policy observations/recommendations # 4

- **#4 Strengthen the business-innovation-research interaction via a living labs approach**
- *It is suggested to support the business-innovation-research interaction by increasing EU and CN funds for companies to become involved in pilot projects.*

DRAFT Policy observations/recommendations # 5

- **#5 Improve financing and concepts related to Sponge Cities**
- *It is suggested to analyze the concepts and related financing opportunities reg Sponge Cities' investments to fully cover a holistic approach, including water quality perspectives for all water cycle elements encompassed*
- *Also regarding the "Sponge City Market", where mechanisms to ensure the technical findings of Lot 3 CeCoSC – that optimal long-term value creation to society needs combinations of so-called 3PA and BGI and synergies with other sectors - to be retained at "the market".*
- *Finally, to ensure financing for involving consultants during the initial stages – screening, scoping, strategy and priority setting, and planning*

DRAFT Policy observations/recommendations # 6

- **#6 Review and adress Market Barriers**
- *Remove barriers and risks for international companies, in particular for newcomers (SMEs) to the market*
- *Change the criteria of reference to previous cases at the Chinese market, in order to allow for more, new companies to take part*

Roundtable Discussion

- Overall comments to the Market and Technology Outlook?
- Comments to Policy Recommendations?

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- Program Manager Henrik Dissing, hedis@mst.dk

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See you at the next Rural Water webinar April 19th, 2022

Small Scale Infrastruture for Rural Areas

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