



Draft Report

Take away messages and good Chinese and European experiences presented

in

CEWP Webinar Series

May 18th, 2021 – Carbon Footprint in the urban water sector

Introduction: The webinar followed by about 40 participants from 12 countries explored the carbon footprint and circular economy of the Urban Water Cycle in Europe and China. The webinar presented experiences and case studies and discussed various approaches to reducing the carbon footprint as well as circular economy approaches with a specific focus on water supply and water waste water treatment. The report presents *take away messages* from the roundtable, the chair and rapporteur of the seminar as well as good experiences presented by the speakers of the webinar. The webinar programme is enclosed as annex to this report and the presentations from the webinar, with more details is available at the CEWP webpage.

Take away messages: Both China and Europe aim to improve the efficiency and reduce the impact of their urban water management activities, however in different contexts. Overall, Chinese cities sees increasing urbanization (with the 14th 5 Year Plan setting a target for 2025 of 65% compared to today's 61%) and construction of new, urban areas, compared to a stronger focus on retrofitting existing urban areas in Europe.

Both China and Europe have set targets to reduce the emission of CHG's. Globally 4% of all electricity is used in the water sector to supply water for human consumption, food and industrial production and waste water treatment. An increased efficiency of the urban water cycle will make more water available but also reduce the emissions of CHG's and make more resources like nutrients and metals available for reuse.

Trends in Europe move towards integrated water and waste water systems and reduction of energy use and CHG emissions per volume of water managed and an emerging integration of water and energy systems. In China energy use and CHG emissions per volume of water managed has been increasing due to a.o. more extended treatment. The potential to reduce the CHG emission and the recovery of resources is

Circular economy 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 in e.g. Europe. Key elements are Increased process control, variable pump speed depending of the load, carbon harvesting, deep process control and knowledge and combined heat and power installations can even make waste water treatment and water supply systems *energy-positive*.



European Chamber
中国欧盟商会



A move from the concept of Waste water treatment Plants to Water Resource Recovery Factories to save resources has been promoted primarily in research and demonstration projects, however is increasingly emerging as a new concept in advanced larger water organisations.

Circular economy solutions are increasingly supported by digitalization technology including monitoring and metering systems of data, data collection systems, data management systems and intelligent information systems.

Integrated water and energy and resource reuse systems increase the outcome of Circular economy solutions and may reduce the impact of the existence of Silo's among institutions involved in urban water and energy management. Of particular importance is the connection of the silos for water supply and waste water treatment and the integration among decision makers. In these sectors.

Procurement of circular economy solutions may not be well specified in tenders. standards can be used to make the demand/requirements for the solutions more precise. This is particular important in multistakeholder water management systems like e.g. catchment system with many different management needs.

Water supply and waste water treatment organizations are natural monopolies and may need incentives and/or regulations/goals from regulatory bodies to invest in circular economy solutions. Energy savings may in some cases however have short pay- back time of investments new technologies. In case a waste water treatment plan can be made energy positive it should be able to provide energy surplus to the energy network.

Energy savings may in some cases have short pay- back time of investments in new technologies in water and waste water infrastructure. 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 be able to sell/provide their energy surplus to the energy network.

From the presentations it appears that European consulting companies with presence in China has a good understanding of the *Chinese market*, has established strong networks and are able to get contracts and bid on tenders. Larger tenders are still primarily won by large Chinese contractors and European technology producers and consultants should aim at building networks and being sub-contractors to these.

Both Chinese and European partners participating in CEWP see a great scope in continuing the cooperation and sharing practices and experiences in China, Europe and globally.

Setting the scene for the webinar

Mr. Henrik Dissing CEWP as chair of the webinar welcomed the participants and set the scene for the webinar in particular the role of the regulatory framework, economic incentives, the



European Chamber
中国欧盟商会



integration of water and energy infrastructure, data management and data integration and standards for tender-based market requests.

Ms. Tia Savolainen, tia.savolainen@sweco.fi, SWECO a consulting company with 17.500 employees and offices in 14 countries presented a White Paper on circular economy of municipal wastewater treatment plants (WWTPs) in Europe, developed as a part of China Europe Water Platform (CEWP). The paper¹ includes a short overview of past developments and current situation, with a focus on innovations and technologies which are likely to be widely applied in the future.

Ms. Haavisto informed that circular economy is a systemic approach in which the waste is minimized, and life-cycle value of natural resources and products is maximized. On contrary to linear “take-make-waste” model, circular economy approach is based on principle of “Reduce-Reuse-Recycle-Restore-Recover, (5R)”. Many resources like energy, water, materials, data, knowhow and value creation could be circular.

Ms. Haavisto informed that case studies show that resources recovered from European wastewaters are for example nutrients such as phosphorus and nitrogen for agricultural use, Metals, CO_2 , Alginate, Proteins, Cellulose and water.

Ms. Jinjing Ma, NORDiQ Group China, a consulting company with offices in Denmark and China with about 50 employees informed about the Chinese green transition towards carbon neutrality 2030/2060 and the implications for the Chinese waste water sector². This will primarily be achieved through investments green investments in 7 sectors- with the investments in energy efficiency being most important for the waste water sector. Waste water treatment leads to large carbon dioxide emissions due to energy use to operate the treatment plants and also the waste water processes themselves generate CH_4 and N_2O which are emitted which both contribute to emissions of CHG’s.

As China has increased its waste water treatment capacity significantly over the last decades and use more advanced and energy intensive treatment processes this has led to increases in emissions of CHG’s from waste water treatment plants.

Ms. Ma expected based on existing plans in expanding and building new waste water treatment capacity that the emissions of CHG’s from waste water treatment plants continue to grow in the coming decade. If the waste water treatment sector should meet the climate targets it would need to halve the emissions by 2030 and reduce it by 70% by 2050 to reach the international IPPC target of 1,5 degrees temperature increase. Ms. Ma considered that the investments in new waste water treatment capacity is essential to meet environmental targets and reduce pollution emissions- but that there may be a need to also look for means to reduce energy use and look at resource recovery from waste water treatment plants in China.

¹ Report available at <https://www.cewp.eu/waterurban>

² Report available at <https://www.cewp.eu/waterurban>



European Chamber
中国欧盟商会



Good experiences in the public and private sector in Europe presented in the webinar

Mr. Jingquan Lu, the Danish Export Organisation informed about the USE project aiming at Uniting Danish and Chinese partners, Support knowledge and Expand business. The aim of the project is to adapt Danish Neutral Energy solutions to Chinese conditions. A number of Danish Waste water treatment plant have reached energy neutrality (producing the same amount of energy as the use to operate the plants). Energy neutrality has been achieved through the use of high quality equipment, biogas production, process upgrading using on-line sensors and advanced process control.

Mr. Mads Warming, global segment director of water and wastewater at Danfoss a Danish company with 28.000 employees, sales offices in more than 100 countries and production in China. Mr. Warming informed about how the Danish Marselisborg Waste water treatment plants with 220.000 people in the catchment moved towards energy neutrality for the whole water cycle- both water supply and waste water treatment.

ROI has been 3 years on process control and 4,5 years on all needed investments

Mr. Warming informed that key elements to obtain energy neutrality includes: Process control based on online sensors (NH₄, NO₃, PO₄, pH, sludge, flow ++), variable speed drives on all rotating equipment, carbon harvesting, digitalization, deep process knowhow. If the water borne energy in outlets from waste water treatment plants were utilized in combined heat and power installations this can e.g. in Denmark provide electricity to 20% of all Danish Households.

Mr. Joao Mugiero from the Portuguese company WAKARU a technology based company with 35 employees focused on developing Big Data Solutions presented the Water Wise System. The system builds on three main elements- monitoring and metering of all elements of the urban water cycle including water and energy nexus, automatization and remotely operation of water systems, and identification of water risk situations in response to extreme climate events. The business model for Water Wise System is “software as a service” – where clients pay a unit price per sensor per month- to get automatically generated data for management and risk reduction. Mr. Mugiero informed that not all waste water treatment plant were ready for the Water Wise System, however that it was often cheaper to sensors and assess data than to invest in new water facilities.

Mr. Ricardo Pancolin from CIB Unigas is an Italian company specialized in production of burners with global sale, presented a full auto control system, the “Facile” system that is suitable for simplifying the commissioning process but at the same time improves the operational efficiency and energy consumption of the burner. Mr. Pancoli informed that the aim of the company is to look to change the perception of the modern-day burner, no longer to be seen as a passive device but an active and autonomous machine that adapts to the plant and environment conditions



Roundtable

Henrik Dissing introduced the roundtable asking all speakers to name their take away messages and topics for further discussion at the workshops to be organized on urban water during the Aquatech Shanghai Event in June.

Jingjing Ma: In the last 10 years in China there has been an increase of 50% energy use for waste water treatment and the energy efficiency of treatment has not increased. From 2015 there is knowledge of energy use of urban water treatment systems. This knowledge is not available for rural water treatment systems which will also need upgrading in the coming decades.

Joao Mugiero: We more or less know what the problems are and solutions are available. We need regulators to push for implementation.

Jingquan Lu: We have the technologies and have organized a Danish partnership model which can offer solutions to China via the USE project.

Mads Warming: Technologies are there and we can upgrade even existing waste water treatment plants. We need regulators to motivate/regulate waste water treatment organisations as they are natural monopolies. Silos between energy and water have to be eliminated. We still need some new technologies, but implementation is the most important.

Ricardo Pancolin: Technologies are available. Legislation needs to be in place. The focus for our company is to improve medium sized burners from 200 kW to a few mW.

Tia Haavisto: Making technologies better is always good-however mind-change and how to make technologies to support circular economy is also important.

Closing session of the webinar

Mr. Liam Jia, liam.jia@eusmecentre.org.cn, EU-SME Centre, a project supported by EU, presented the four services which are free of charge to European Small and Medium Sized companies: Knowledge Centre, Advice Centre, Training Centre and SME Advocacy Platform. Mr. Jia informed



Funded by the
European Union



European Chamber
中国欧盟商会



that they organize two seminars in Shanghai on (i) digitalization and (ii) circular economy. A consolidated report presenting the observations and recommendations from the 4 Urban water webinars will also be available. In addition they will organize a customized exhibition in the upcoming Aquatech Meeting in June in Shanghai, matchmaking meetings, on-line workshops. Linkup between European and Chinese SME's, and that he could be contacted for more information.

<https://www.eusmecentre.org.cn/>

Mr. Henrik Dissing, hedis@mst.dk, CEWP closed the webinar and thanked RAI Amsterdam for their assistance in organizing the event and the interpreters for their work during the event. The slides from the event and a short report would be made available after the webinar on the CEWP webpage. He also hoped that participants who had the possibility would participate in the events during the upcoming Aquatech meeting in Shanghai 3. June 2021. and would also come to the IWA

*Rapporteur: Mr. Palle Lindgaard-Jorgensen, In-Water, plj@in-water.dk **CEWP Webinar Series***



May 18th – Carbon Footprint of the Water Sector

China and EU have set ambitious targets for achieving energy efficiency and carbon neutrality. The Water Sector must contribute. How to reduce the sector's carbon footprint? Which solutions are available for energy efficient water resources provision? How to ensure net-energy producing wastewater treatment plants? How to reduce NO-emissions for WWTPs? How to integrate wastewater treatment in resource recovery plants?

Program - Chinese Time/European Time

14:00/08:00	Welcome remarks, Henrik Dissing, CEWP
14:10/08:10	White Paper: Circular Economy of Municipal Wastewater Treatment Plants in Europe – Tia Savolainen, SWECO, FIN
14:23/08:23	China Carbon Neutrality 2030/2060 of Wastewater Sector – Jingjing Ma, NORDIQ Group, CN
14:36/08:36	On the way to adapting Danish Energy Neutral Solutions to Chinese Conditions – Jingquan Lu, Danish Export Association, DK
14:46/08:46	Energy producing wastewater facilities towards GHG neutrality – Mads Warming, Danfoss, DK
14:56/08:56	Water Wise System helping water utilities to reduce the carbon footprint – Joao Mugeiro, Wakaru, PT
15:06/09:06	All Burners are no longer the same: A Technological Breakthrough – Riccardo Pancolini, CIB Unigas, ITA
15:16/09:16	Roundtable
15:50/09:50	EU SME Centre
15:55/09:55	Closing remarks, Henrik Dissing CEWP