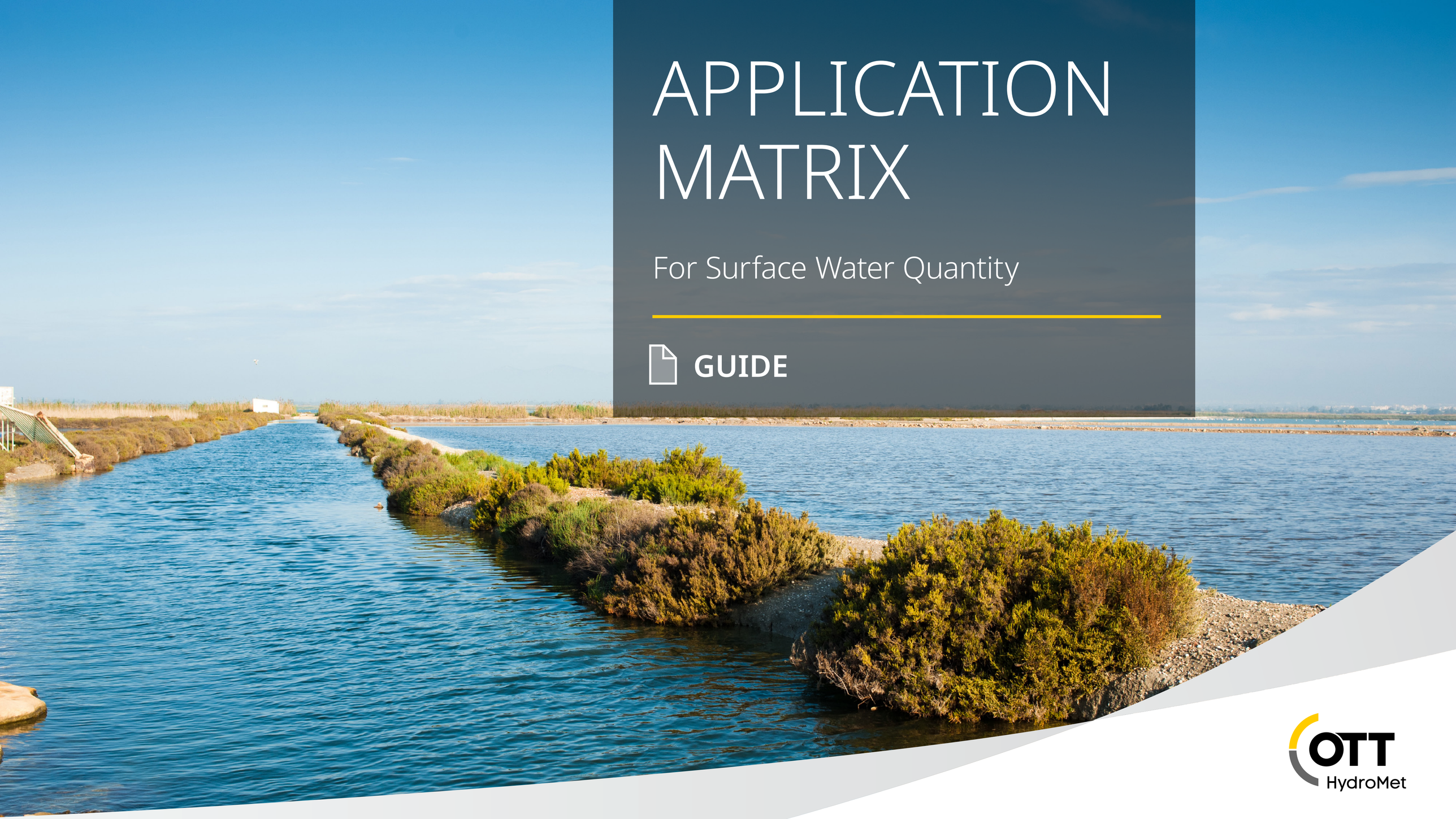


APPLICATION MATRIX

For Surface Water Quantity

GUIDE

OTT HydroMet

The Growing Need for Reliable Data

Through OTT HydroMet projects across the globe, we've seen first-hand that surface water quantity projects have a growing need for data to meet the needs for water availability, flood control, and numerous other critical issues. Our experts understand the need for granular data as critical decision making becomes more time-sensitive.

The number one issue we've witnessed is a lack of trust in the data collected – either because there is not enough data to understand the real-time situation, or because there is no reference to validate it. Trusted, error-free data ensures that decisions can be made confidently. In this guide, we outline the benefits of increased data points and redundant hardware to help increase trust in data, while also reducing unnecessary site visits through remote site access.

Unique for Your Application

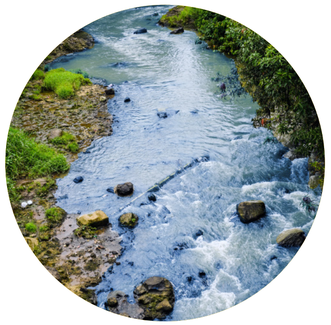
Surface water quantity monitoring includes parameters such as water level, discharge, and precipitation. This data is used for drought monitoring, water resource management, flood control via dams and flood gates, real-time flood mapping, predictive modeling, and more.

For the purposes of surface water quantity, we've outlined the below three major applications that require more data, more often.

"When it comes to these major applications, it's important to have seamless data from the field to the database – data that can be trusted during crucial moments."

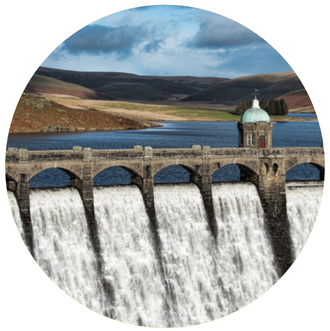
Brandt Hellstern, Water Quantity and Sales Lead
brandt.hellstern@otthydromet.com

Major Applications of Surface Water Quantity Monitoring:



Stream Gaging

Monitoring at streams and rivers.



Reservoirs/dams

Monitoring water level to drive decision making.

Event Monitoring

Monitoring streams, lakes, rivers, and more to be alerted of critically high water levels.

1 What is being monitored?	Why and how?	How do I increase my operational efficiency?
 Streams and rivers, for stream gaging	‣ To manage water resources, supply, usability, and rights. This is done by measuring water level, flow, stage, area, discharge, and velocity (including mean-channel and cross-section). Methods include in-stream velocity or continuous measurement and discharge calibration.	Water resource management relies on accurate data, both spatial (determined by the breadth of the monitoring area) and temporal (determined by how frequently data is collected, i.e. every 5 minutes). In order to assign water to areas where it is needed the most, it's beneficial to **have more stations within a region** and have **data points collected and transmitted more frequently**. Having **redundant hardware** also helps confirm the accuracy of the data being used for important decision making.
 Reservoirs/dams	‣ To protect lives and infrastructure by opening/closing dam and flood gates. This is done by using water level (and possibly additional) data to remotely control dam and flood gates based on what will be affected downstream of water flow. Data helps professionals understand water supplies and improve flood protection.	Water resource management via dams and reservoirs can have immediate impacts on public safety and infrastructure in the surrounding area. For this, **timely data** is especially important to ensure that the right flood gates are being opened/closed at precise moments. **Redundant sensors** ensure that if high water levels impair a sensor's performance, there will be a back-up to continue delivering data during those critical moments.
 Event monitoring	‣ To protect lives and infrastructure by directing emergency personnel and the public. This is done by using water level (and possibly additional) data to prepare emergency responders, organize potential evacuations, and use control capabilities (i.e. flood gates, traffic signals, etc). Data helps professionals achieve advanced flood and storm warning.	Real-time data is now setting the precedent for modern flood monitoring. This is driven by a need for real-time flood mapping, improving predictive models, and immediate evacuation plans. Conditions during emergency water events can change rapidly. Having **real-time spatial and temporal data** is important to know what has changed, when it changed, and where to divert resources. **Redundant hardware** at each station, especially when installed above the water, helps ensure reliability and validity.

2a What current technology should I consider?

How does it work?

SUTRON SatLink3 Lite

Evolving dataloggers and telemetry methods create a variety of options to choose from for collecting data and communicating with stations in the field, the most useful being remote communication. Major telemetry options include GOES Satellite, IRIDIUM® Satellite, and cellular. GOES is convenient for low data bandwidth and allows for both near real-time monitoring and historic records.

Our latest release, designed for hydrology and meteorology applications, is the SUTRON SatLink3 Lite Data Logger. It is designed as a cost-effective, reliable data logger to log and transmit data via GOES. It allows measuring, processing, and logging data from smart sensors for up to 1 million readings without any overlap. It is also compatible with the common operating software LinkComm, which has an intuitive interface and delivers easy access to data.

The SatLink3 Lite interfaces easily with LinkComm software, which runs on Windows PC, iPhone/iPad, and Android platforms. It connects either locally through USB cable or local Wi-Fi, or remotely with added security through a VPN and using the SUTRON Redirector to access.

LinkComm can be used to set-up stations, download data logs, upgrade firmware, check equipment status, and calibrate connected sensors – all remotely. Its interface is user friendly with quick-to-view dashboard, measurements, data, telemetry, and diagnostic tabs, and configuration can be done easily within 5 minutes.

“Transmitting data from the field is more cost-effective than ever, especially through the SatLink3 Lite Data Logger that our team recently launched.”

Sherif Ahmed, Global Product Manager

SUTRON XLink 500

When dealing with higher data bandwidth, the SUTRON XLink 100/500 logging transmitter and the SUTRON SatLink3 transmitter are suitable choices. The XLink 500 is a multi-sensor input logger, compatible with analog, that can take in up to 32 measurements, log up to 1,000,000 readings, and handle multiple interfaces and protocols including HTTP, TCP/IP, and FTP.

Telemetry options include cell and IRIDIUM, which both allow for two-way communication. Both the XLink 500 and the SatLink3 offer Python scripting capabilities for increased customization as well as easy data access through LinkComm software.

Data from our smart sensors/dataloggers are also easily digestible by third-party software packages if desired.

The SatLink3 and the XLink 100/500 include plug and play modems for cell and IRIDIUM, which allow you to easily move from one telemetry type to another. Both telemetry options allow for two-way communication, or remote site access.

Remote site access is a huge benefit since it allows you to make changes to a site’s configurations remotely from your office. This reduces time in the field, number of visits to the field, and the amount of time spent learning on the spot. You can remotely check what’s going on at your stations and plan better for your next visit, and even forgo unnecessary visits if the site is running smoothly. This reduces your total cost of ownership when it comes to: regular field maintenance, traveling to the site, labor/staff requirements, set-up and installation.

2b What current technology should I consider?	How does it work?
 OTT SVR 100 **Non-contact sensors** are currently cutting-edge due to their dramatically decreased maintenance requirements from avoided debris, sediment, and flash floods. This is because they can be installed above the water surface by mounting on a bridge, pier, mounting arm, or other high location. Non-contact sensors are typically associated with water level monitoring (as seen through the OTT Radar Level Sensor or RLS) but in actuality, non-contact sensing includes a variety of parameters like velocity via hydrometry, as seen by the OTT Surface Velocity Radar (SVR) 100 which is a compact velocity sensor for measuring flow in open channels and rivers.	The OTT SVR 100's measuring principle is based on the latest state-of-the-art radar technology and uses measurement filters to reduce the influence of wind drift, surface waves, vibration, or rain. The sensor measures the Doppler shift to derive velocity. OTT Prodis 2 software, when paired with the OTT SVR 100, takes velocity measurements from the sensor and uses the Index Velocity Method to generate calibration data by computing a calibration factor called ***k***. This is necessary to compute discharge and relate surface water velocity to mean-channel water velocity. Python scripting can also be used to calculate the Index Velocity Method, by writing a script to compute the values collected from a smart sensor. This can even be done directly within a data logger when using the SUTRON XLink 500 or SUTRON SatLink3, which have built-in Python scripting, for a streamlined calculation process.
IP Cameras or webcams are a growing trend because they are beneficial to reduce the number of site visits needed into the field, to conserve employee time and resources.	After installing a camera at your station and establishing a data transmission channel, the camera allows you to see your station in near real-time to verify measurements and assess maintenance needs.

Reducing Your Total Cost of Ownership

Accurate, reliable data eventually reduces lifetime costs for your stations. This can be achieved by placing stations at strategic sites and having validated sensor measurements through additional, redundant hardware. Investing in sensors that last for +10 years helps ensure equipment reliability.

One common concern associated with accepting new technology is having to deal with a wider variety of equipment existing simultaneously within one network. This increases the amount of time employees need to learn how to operate equipment and onboard new members. You can avoid this problem by standardizing your network wherever possible and only using high quality hardware to replace larger components of a network at a time.

OTT HydroMet's experts carefully develop and curate the best options depending on your unique network and data needs. Our service and support teams offer resources like trainings and phone consultations to guide installation and maintenance as needed. Our sales team also works hands-on to visit on-site and support trainings as requested. This reduces the amount of time your team needs to sink into researching and learning technology, so you can focus on your top priorities.

When data is readily accessible, you can also estimate your budget better by planning upcoming costs and have a better understanding of what maintenance will be required at what times.

Benefits that Outweigh the Costs

More data doesn't correlate with more work required by your team – increased data points can reduce uncertainty when making decisions and save employee time and resources from unnecessary field visits.

The sooner you invest in high-quality hardware to have more in-depth data, the more payoff you will receive in the future. When a network continues to deliver incomplete data at a slower rate, it can trickle down to negative long-term consequences for crucial decision-making that impacts the people, environment, and infrastructure nearby. By investing sooner, your community can reap the benefits of near real-time spatial and temporal data to help deliver impactful insights and greater confidence.

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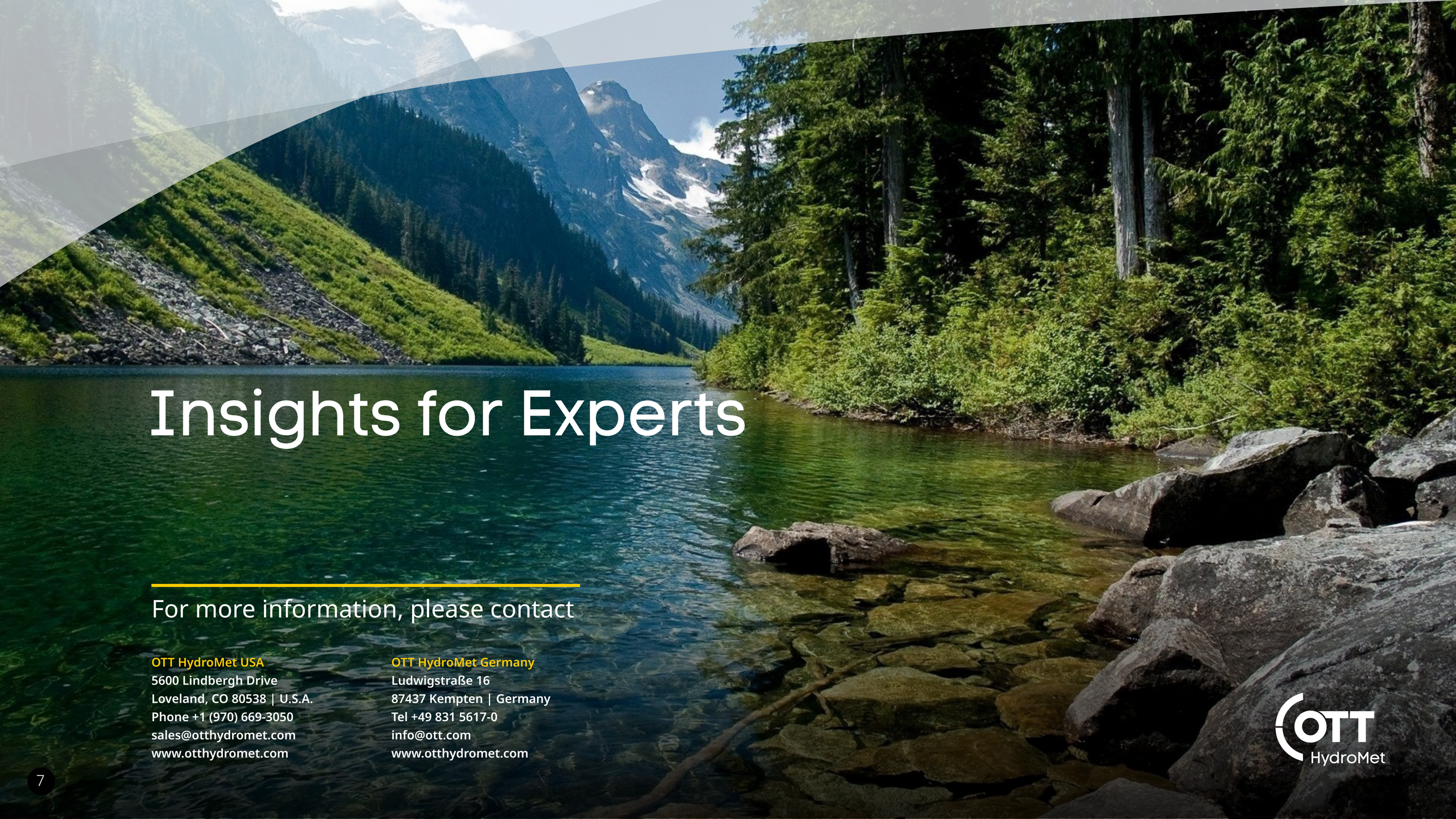

Insights for Experts

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