ZeroPollution4Water
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Case Study:
Key steps for market uptake of the THM Analyser

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EXECUTIVE SUMMARY

Innovative monitoring and control technologies are vital for protecting water quality and public health, but adoption is often slow due to fragmented regulations, unclear business cases, and limited stakeholder awareness. Many developers come from engineering or academic backgrounds and may lack strong market engagement skills, while lab-scale innovations typically require a decade or more to reach maturity.

This guidance outlines best practices and adaptable pathways across various dimensions with a focus on practical aspects and strategies. While this analysis is specific to the on-line THM analyser, the structure, the analysis and the recommendations can be used and adapted for most technologies.

This guide offers a flexible blueprint to accelerate adoption, enhance public health protection, and optimize water treatment operations.

This short guide will provide the basic elements needed to consider once you decide to take the technology develop to the market. This guide presents a structured set of non-binding, advisory recommendations to accelerate the market uptake of innovative water treatment technologies.

The **reagent-free THM analyser** developed by **Multisensor Systems Ltd**. as a guiding example and we will explore a set of approaches and recommendations for Market Update of the Selected Technologies.

What do you need?

The following steps are necessary to provide you with a strong strategy that will help your technology in a long and medium term.

- Step 1: **Market Analysis**
- Step 2: **Barriers**
- Step 3: **Understanding your Drivers**
- Step 4: **Business Case**
- Step 5: **Sales and Marketing Activities**
- Step 6: **Regulatory Guidance**
- Step 7: **Guidance and Standards**
- Step 8: **Align with the business strategy**
- Step 9: **Finance**

The views expressed are solely those of the author. This work was produced as part of the objective of Working Group 6: From R&I to Impact. WG6 facilitate the deployment of a cutting edge competitive technologies, governance models and best practices in the field of zero pollution for drinking water and groundwater.

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1 Market Analysis

The first step is to assess market trends, opportunity size, key stakeholders, and buying dynamics for the technology. The global market for online water-quality monitoring is expanding, driven by Industry 4.0, automation, and tighter water regulations. While data for THM sensors is limited, comparable products (e.g., UV254 analysers, nitrate sensors) are forecasted to grow at 5–7% CAGR through 2030.

The global market for online water-quality monitoring systems is expanding, because of trends such as Industry 4.0, increased automation and a drive to improve water quality. Specifically tighter DBP regulations are making the case for on-line THM monitors increasingly compelling. Although specific figures for THM sensors are scarce we can look at similar products, such as UV254 analysers, nitrate sensors that are projected to grow at a 5–7% CAGR through 2030. An effective market analysis needs to succinctly identify drivers and barriers with a specific focus on existing and upcoming regulations, process needs and financial feasibility.

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2 Understanding the barriers

In any endeavour to promote a product within a market is of paramount importance to understand the barriers. Here we try to highlight some high-level barriers that we will then try to overcome throughout this case study.

- **Standardisation Gaps:** No unified ISO/ASTM protocols exist for performance validation of on-line THM analyzers. This means that the end user (the WTP) can mainly rely on case studies, references and data provided by manufacturers or has to undertake the costly duty to assess various technologies.
- **Regulatory Uncertainty:** Lack of explicit requirement in regulations for continuous on-line THM monitoring makes it harder for companies to invest in on-line THM monitors. Most regulations refer to the desired outcome (i.e. a maximum permitted level of THMs) and not on how to achieve it.
- **Economic Hurdles:** High upfront costs and unclear Return on Investment (ROI) make procurement decisions slow. Unless the monitoring of THMs is associated with actionable treatment procedures, it is quite difficult to justify the investment. This means that usually, investing in a THM analyser and having a real-time data, comes with additional requirements for treatment.

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3 Understanding the drivers

As for the barriers, understanding the drivers within the industry is essential for approaching the commercialisation of any product in an efficient way. Here below we will analyse which are the drivers for the adoption of a THM analyser.

- **Regulatory Pressure:** The U.S. Stage 2 Disinfection Byproducts Rule mandates more frequent THM compliance monitoring, encouraging utilities to explore continuous solutions; the EU Directive (EU) 2020/2184 confirms the limit of 100 µg/L (micrograms per liter) for the sum of four THMs and while it does not mandate on-line monitoring, the frequency is based on population served and water volume and on-line monitoring is nonetheless desirable.
- **Operational Efficiency:** Real-time THM data enables optimised aeration, precursor removal, and chlorination strategies, reducing DBP formation and treatment costs. This is an important driver above all in the US market where on-line THM analysers have already been installed for a considerable amount of time and the question of their energy efficient use becomes increasingly important.

Additional drivers include:

- **Commercialisation**
- **Standardisation**
- **Direct application**
- **Opportunities to maximise return on investment**
- **Strengthen market**
- **Policy uptake**
- **Sector competitiveness**
- **Deliver tangible benefits to end-users and society at large.**
- **Further research**
- **Need for a low-OPEX solution (i.e., reagentless) to monitor THMs online.**

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4 Building the business Case

Once barriers and drivers have been understood, it is important to define the business case. We will systematically approach this part looking at costs, benefits, options and other factors.

- **Background:** Provides the background of the business issue, the methods used to examine it, and identifies key stakeholders.
- **Problem/Opportunity Statement:** Clearly defines the business problem or opportunity that the project aims to address.
- **Options Analysis:** Explores different solutions, including the option of taking no action, and provides reasons for choosing the preferred option.
- **Benefits, Costs, and Risks:** Includes a detailed analysis of the expected benefits, financial costs (including resources like personnel, software, and hardware), and potential risks associated with the project. A cost-benefit analysis is often included here to show the potential return on investment (ROI).
- **Financial Case:** Assesses the project's affordability and includes a detailed budget **and potential contractual arrangements.**
- **Summary:** Provides a high-level overview of the idea, costs, and key **benefits.**

For the technology to be attractive on the market, it should not be seen only as a sensor, but as part of a data solution. This means that the analyser does not just produce numbers, but delivers usable information that can connect with existing systems and support better decisions:

- **Easy connection with other systems:** The analyser should “speak the same language” as existing plant control systems (SCADA) and databases, using open and standard formats. This ensures that utilities do not need custom integration.
- **Flexible deployment (local or cloud):** Data should be accessible locally in the plant (for sites with strict IT policies) or securely via the cloud (for easier monitoring of many devices, updates, and dashboards).
- **Actionable insights:** Beyond showing THM values, the analyser should give recommendations on how to act (e.g. when to adjust aeration or chlorination). This helps operators save time and improve water quality.
- **Future-proof for Digital Twins:** The analyser should provide reliable, well-tagged data that can be used in advanced simulation and optimisation tools.
- **Strong cybersecurity:** Data must be protected with encryption and secure access, following international standards. This ensures trust when devices are connected to critical infrastructure.
    - Geographical (e.g. Europe vs the USA vs Asia-Pacific etc.) which may have different shares in the market and its growth, as well as variable regulatory aspects.
    - Customer type (e.g. WTPs versus Swimming pools?).

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A targeted market segmentation is essential for effectively commercialising online Trihalomethane (THM) monitoring technologies.

By geography:

- **USA:** High regulatory pressure (Stage 2 DBPR), established early adopters; prioritize ROI-driven messaging and energy/chemical savings.
- **EU:** Harmonized quality limits (Directive (EU) 2020/2184), uneven uptake; emphasize compliance readiness and interoperability with existing SCADA.
- **APAC & LATAM:** Fast growth, heterogeneous regulation; emphasize robustness, OPEX reduction, and distributor enablement.

By customer type:

- **Water Utilities/WTPs:** Primary target; value continuous optimization, SCADA integration, and lifecycle cost reduction.
- **Industrial users (beverage/food):** Secondary; emphasize brand protection, quality assurance, and auditable analytics.
- **Recreational water (pools/spas):** Niche; emphasize safety and simple operations.
- Priority beachheads (12–18 months): (i) Tier-1 US utilities with DBP challenges; (ii) EU utilities in regions with tighter DBP oversight; (iii) flagship industrial water users seeking continuous compliance evidence."

Geographic Segmentation

The global market for online THM monitoring exhibits distinct characteristics across key regions, driven by varying regulatory frameworks, adoption maturity, and economic drivers.

- **North America (USA & Canada)**
  - **Characteristics:** This region represents the most mature and a regulatory-driven market. The U.S. Environmental Protection Agency's (EPA) **Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR)** mandates strict reporting of annual averages for THMs, creating a compelling need for continuous data. In this market there are many established early adopters, a high awareness of compliance risks, and a strong focus on operational efficiency.
  - **Messaging:** Should emphasise **Regulatory Compliance Assurance, Risk Mitigation** against violations, and a clear **Return on Investment (ROI)** through reduced laboratory sampling costs, optimised chemical dosing (chlorine, coagulants), and lower energy consumption from improved treatment processes.

- **European Union (EU) & United Kingdom**
  - **Characteristics:** The market is shaped by the **Drinking Water Directive (EU) 2020/2184,** which harmonises and tightens THM limits across member states. However, adoption is uneven, with some utilities being more proactive than others.

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- **Messaging:** Focus on **Compliance Readiness** for the new directive's monitoring requirements and **Process Optimisation.**

- **Asia-Pacific (APAC)**
  - **Characteristics:** This is a high-growth, highly heterogeneous market. Advanced economies like **Australia, Singapore, Japan, and South Korea** have stringent, well-enforced regulations similar to the West**. China and India** are rapidly developing their water infrastructure, and regulation catching up rapidly. The primary drivers are public health concerns and the need for scalable, modern water management solutions.
  - **Messaging:** In developed APAC, mirror EU/US compliance messaging. In emerging markets, emphasize **Technology Leapfrogging, Operational Expenditure (OPEX) Reduction**, and **System Robustness** for challenging water quality conditions. A strong distributor and partner network is critical for market entry and support.

- **Latin America (LATAM)**
  - **Characteristics:** Similar to emerging APAC, this region shows fast growth potential but faces fragmented regulation and budget constraints. Key opportunities lie with large, modern utilities in major urban centers in countries like **Brazil, Mexico, and Chile**. The focus is on practical, cost-effective solutions that demonstrate quick operational benefits.
  - **Messaging:** Prioritize **Cost-Effectiveness**, **Ease of Use**, and **OPEX Reduction**. Frame the technology as an enabler for improving service quality and operational control, even in the absence of extreme regulatory pressure.

- **Middle East & Africa (MEA)**
  - **Characteristics:** A diverse and emerging segment. The **Gulf Cooperation Council (GCC)** countries (e.g., UAE, Saudi Arabia, Qatar), with their focus on technological leadership and high-quality infrastructure, represent a key early-adopter segment. Elsewhere, the market is very limited and in embryonic state.
  - **Messaging:** In the GCC, focus on **Technological Leadership** and **Water Security**. Across the wider region, emphasize **Public Health Safeguarding** and the system's suitability for arid conditions and challenging source waters.

Customer-Type Segmentation

The value proposition for online THM monitoring shifts significantly across different customer verticals, from large municipal utilities to specialized industrial applications.

- **Water Utilities & Public Water Treatment Plants (WTPs)**
  - **Profile:** The primary target market. These are public or publicly-regulated entities responsible for municipal drinking water.

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- **Key Drivers & Pain Points:** Ensuring continuous regulatory compliance, minimizing the risk of public health advisories, optimizing chemical usage to reduce costs.
- **Value Proposition:** Continuous compliance.

- **Industrial Users (Food & Beverage, Pharmaceuticals)**
  - **Profile:** A high-value secondary market. These companies use municipal or self-supplied water as a critical ingredient or process utility.
  - **Key Drivers & Pain Points:** Protecting product quality, taste, and brand reputation; ensuring compliance with internal quality standards (e.g., HACCP, GMP); and having auditable, real-time data for customer and regulator inspections.
  - **Value Proposition:** Focus on **Brand Protection**, **Quality Assurance**, and **Auditable Analytics**. Position the technology as a key component of a modern Quality Management System (QMS).

- **Other markets:** Recreational Water (Public Pools, Aquatic Centers, Spas) and Commercial and Institutional Facilities (Large Hospitals, Universities, Hotels).
  - While in theory these are potential markets, in practice the cost of the online THM analyser makes these prohibitive.

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5 Sales and Marketing activities

Multi-site pilots to publicly share performance data and lessons learned are a must. Installing one or more units and partnering with a local water company is one of the most effective ways to start the market uptake of a product. This first step will create the dataset, information and case study that can open more doors.

5.1 Innovation Hubs

Once (or while) the pilot unit is running, organise events and presentations at water technology centres (e.g., Water Research Foundation projects). This is a good way to achieve early feedback and fine tuning the products.

5.2 Exhibitions with Conference Presentation

When the pilot unit trial has successfully ended and a few presentations have been done at innovation hubs, the next logical step is to present the instrument (and the data) at a major exhibition such as AQUATECH in Europe. In this step it is important not only to be present at the exhibition with a stand but, above all, to present the case studies and the information from the pilot at the conference areas that usually run in these conferences.

5.3 On-line presence

While points 5.1, 5.2 and 5.3 are running it is extremely important to invest in the on-line presence specifically:

- Website: mobile friendly, optimised for AI, multilingual.
- Brochures, datasheets and marketing collaterals.
- Social Media presence: constant and professional.

These will be the tools used for passive promotion and to attract customers and interested parties.

5.4 National Sales and Marketing Activities

At a national level it is important to conduct all the usual sales activities such as:

- Visit customers (i.e. water treatment plants).
- Organise Open-Days to visit the company.
- Organise visits to the Pilot Site (this can also be in the form of a Lunch and Learn).
- Publish articles in specialised magazines.

5.5 International Sales and Marketing Activities

At an international level it is important to conduct all the usual sales activities such as:

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- Visit customers with local distributors.
- Take part to conferences and special interest groups.
- Organise webinar and other online activities.

So in a nutshell:

- **Pilot Units:** Co-fund pilots with water utilities to generate real-world performance data and case studies that open the market.
- **Innovation Hubs:** Use pilots to present at water research centres, gaining early feedback and refining products.
- **Exhibitions:** After pilots, showcase results at major trade fairs (e.g.,AQUATECH) and present case studies in conference sessions.
- **Online Presence:** Invest in a strong website, brochures, and professional social media for continuous visibility.
- **National Sales:** Customer visits, open days, pilot-site tours, and articles in trade magazines.
- **International Sales:** Leverage distributors, conferences, and webinars for broader reach.
- **Regulatory Guidance:** Support white papers with universities, join working groups, and engage stakeholders at national and international levels to push adoption into regulations.
- **Case Study Repository:** Maintain a database of global deployments with metrics and lessons learned.

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6 Regulatory Guidance

While having robust data as explained is important, encouraging regulators to issue specific guidance is certainly of paramount importance. Many SME however, find themselves facing the issue of: “How do we encourage the regulators? How does this activity look like?”. Many SME do not have the knowledge, connections and understanding to influence and shape regulations. In the case of an on-line THM analyser these activities can look like:

- Actively participate to water interest groups and projects, thus getting the connections that can be needed to present the technology to regulators.
- Present scientific papers or field data at conferences and exhibitions.
- Ask one’s customers for specific contacts or references to regional/provincial level regulators, especially in countries where the governance structure of the water sector gives some margin of manoeuvre to the local level.
- Create well-crafted and well-thought documentation and marketing collaterals with the idea of promoting the analyser on-line and off-line.
- Take part to governmental initiatives and forum.
- Last but not least, set up meetings with relevant ministries and bodies such as the EA, Water Departments and so forth.

In a nutshell, influencing the regulators is done by first creating the hard evidence and scientifically sound case for the analyser and then by implementing a multi-pronged campaign to “touch” all the different actors until an opening is found.

This part is the one where SME usually struggle with because of its seemingly vague nature. The list above, while very general, if implemented in a systemic way can certainly help to achieve the desired results.

By systematically addressing regulatory, technical, financial, and various barriers—and leveraging real-world pilots and standardized validation protocols—stakeholders can unlock the full potential of online, reagent-free THM analyzers.

While it might seem that this should be the first step, realistically speaking, for most SME, this is a very difficult task since it implies to be part of decision-making channels.

White Paper to EPA/WHO/EU

Present data comparing online THM analyzers with EPA Method 501.3 and WHO recommendations. The white paper should advocate for incorporation into Stage 2 compliance options. Obviously, this would have to be done in conjunction with one or more universities and technical institutes to give credibility to the effort.

Regulator-Industry Working Group

Establish a joint committee to fast-track endorsement of performance criteria and data-acceptance protocols.

Presentations and discussions with stakeholders

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Both at national and international level, through various contacts, it is important to discuss the importance of the parameter and find the various ways in which this can be included in the regulations in various countries (and this will change from country to country), some examples can be:

- Customer contact → Local Health Authority → National Health Authority → Ministerial level → Legislation → Regulation.
- University contact → Water Authority → Working group → Regulations.
- Customers Advocacy Groups → Mayor of a City → Regional Health Authority → Regulation.

This process obviously is difficult to standardise, but the general principle that can be followed is to adapt one's approach to each country and its structure in the water industry.

Case Study Repository

Maintain a living database of global deployments (e.g., Multisensor MS2000) with performance metrics, cost-benefit analyses, and operational insights.

In summary

- Pair solid data with active outreach.
- Engage in projects, conferences, and forums.
- Leverage customer/regulator contacts.
- SMEs need structured, multi-pronged advocacy to shape policy.

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7 Standards and Protocols

For the THM analyser the following stardards have been considered: **(EPA 501.3, EN ISO 10301).**

- Define simple, repeatable testing (sampling, lab checks, analysis).
- Provide clear reports to build end-user confidence.

An important step is to develop a testing protocol and documentary evidence that builds on recognised standards.

For example, in the case of THMs, Method 501.3, is an EPA-approved procedure specific for measuring trihalomethanes (THMs) in drinking water using gas chromatography/mass spectrometry (GC-MS); in the same way in the EU the method EN ISO 10301: Gas chromatography (GC) with headspace sampling, is specifically designed for THMs analysis.

By developing a testing protocol which is simple to follow we can:

1) Develop a robust set of data that can be presented to end users.

2) Give the end users a way to carry out their own validations without ambiguity.

A testing protocol could describe, for example: length of testing period, number of samples to be compared against a certified laboratory analysis, sampling method, data analysis and so forth.

The result could be a report highlighting:

- Information on test site.
- Data from the on-line analyser.
- Comparative data from the laboratory.
- Methods for sampling, sample transportation etc.

Having this robust set of data and repeatable protocol creates the initial confidence in the end user to answer to the question: "*Does this analyser (or technology in general) work?.*"

Moreover including performance KPIs and data quality can further improve this. Each validation must report:

- **Analytical KPIs:** accuracy vs. lab (bias, RMSE), LoD/LoQ, drift per 30/90 days, response time (t90), uptime %, false positive/negative rates for species differentiation.
- **Operational KPIs:** maintenance hours/month, consumables cost (should be near-zero), calibration frequency, MTBF.
- **Business KPIs:** chemical/energy savings, avoided lab analyses (%), compliance risk reduction (events/year), estimated payback period.
- **Data quality:** completeness %, timestamp sync, QA/QC flags, outlier handling, uncertainty estimates.

By providing a standard results template utilities can replicate and compare pilots increasing the base of data to take action.

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8 Align with the overall business strategy

This step includes all the previous steps and should highlight the product's specific benefits, making it easier to build effective materials. For the Multisensor Systems THM analyser, the key advantages are:

- **Reagent-free analysis:** cuts consumable costs and downtime.
- **Online differentiation:** neural network separates THM types for richer data at lower cost.
- **Contactless measurement:** minimal maintenance and drift.
- **IP:** all this build on years and years of experience and technical development.

In developing a successful marketing strategy to be aligned with the company's business strategy is crucial. It is important to clarify which are the specific benefits that the product brings on the market. Having these clearly laid out will make it easier to produce marketing material, documentation and so on. In the case of the Multisensor Systems THM analyser the benefits can be so listed:

- **Reagent-Free Analysis:** Eliminates expensive consumable costs and maintenance downtime.
- **On-line differentiation:** Using a neural network to differentiate between different kinds of THMs, the customer can get more information at a fraction of the cost.
- **Contactless measurement:** A contactless measurement technique makes maintenance and drift minimal.

Those above are the three main benefits of the THM analyser and these points will need to be developed and explained in the marketing material.

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9 Finance

It is important to look also at the financial aspect and the ROI – when available – for the use of an on-line THM analyzer. In the specific case of a THM analyzer there are mainly three possibilities:

- **No immediate ROI:** in the case the analyzer is installed for monitoring and compliance purposes only and its readings are not used for process control.
- **Moderate ROI:** in the case the analyzer is used to optimize dosing of chemicals and mixing of water sources.
- **High ROI:** in the case the analyzer is used to optimize highly expensive-to-run aeration systems.

For example, if we were to make an educated assumption, a plant that feeds 500,000 people and is trying to reduce THMs levels through aeration (assuming a reduction from 80 ug/l to 40 ug/l) would be spending tens of thousands (if not hundreds of thousands) on energy costs alone.

By installing an on-line THM analyzer these costs can be greatly reduced and, having the ability to speciate, would also allow to improve the treatment even further.

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