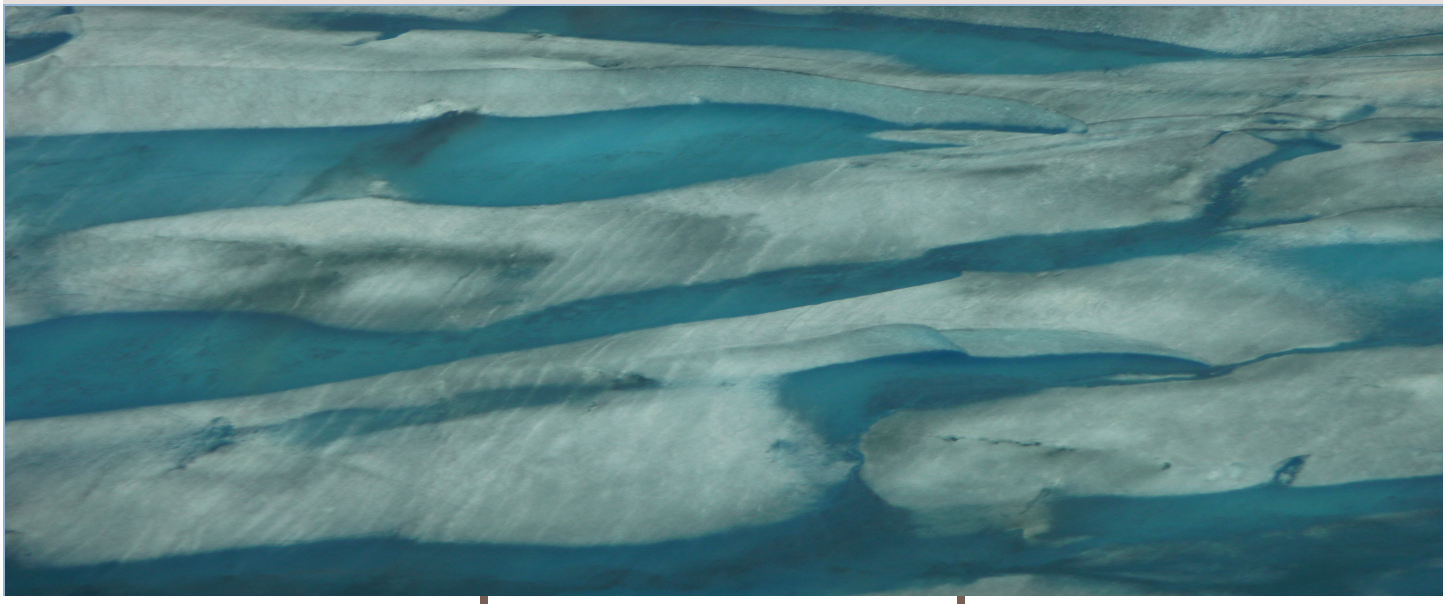
VerifiGlobal Newsletter Special Issue

weftec 2019
the water quality event™

Global threats to water security, resiliency and sustainability derive from population growth, rising demand for water resources, jurisdictional disputes, and the effects of climate change. At the local level, water resiliency and sustainability require access to and effective transformation of water for multiple end uses.

The new paradigm for water resiliency and sustainability is based on watershed and ecosystem carrying capacity, climate change adaptation, and the integration of water and energy efficiency across all activities.



SUSTAINABLE WATERSHEDS

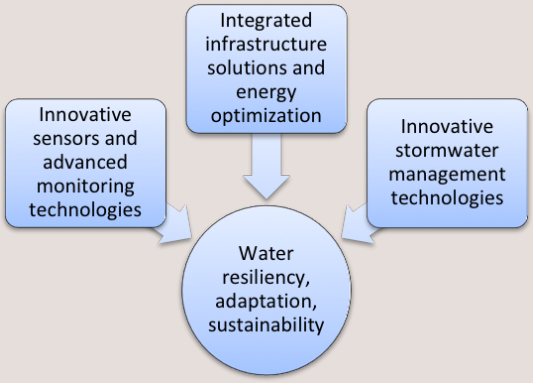
Innovative stormwater management technologies address sustainable management of watersheds, stormwater flows and non-point source pollutants

EFFECTIVE DECISIONS

Innovative sensors and advanced monitoring technologies provide reliable information and effective decisions based on measurement, analysis and feedback

OPTIMIZED ADAPTATION

Integrated infrastructure and energy optimization technologies permit flexible adaptive solutions and enable stable predictable infrastructure investments



RESILIENCY, ADAPTATION, SUSTAINABILITY

VerifiGlobal has identified three areas that can benefit from comprehensive, evidence-based performance benchmarking and verification in advancing innovative water technologies and infrastructure.

VerifiGlobal Alliance

The VerifiGlobal Alliance is a global network of organizations providing testing and verification services across multiple sectors and areas of expertise. Its mission is to strengthen long term, sustainable performance through improved efficiency, quality assurance and accountability.

The VerifiGlobal Alliance is comprised of 12 established technology performance testing and verification organizations in 8 different countries.

http://verifiglobal.com

Why a collaborative initiative for water resiliency, adaptation and sustainability?

Resilient, sustainable water management is a continuum, which both supports and depends upon decisions and subsequent actions based on measurement, analysis and feedback. Society expects project proponents and solution providers to deliver results that reduce or eliminate negative ecological impacts, provide superior performance, and/or use fewer resources relative to conventional practices. Market acceptance and subsequent adoption of innovative water solutions are most likely to succeed through iterative approaches that demonstrate measurable benefits in the context of climate change and adaptive long-term environmental management.

September 2019 Newsletter Main Topics:

1. Stormwater Management
2. Sensors and Advanced Monitoring
3. Optimized Adaptive Infrastructure
4. World Economic Forum

Implementation of innovative water solutions requires reliable information on the performance of operating systems, processes and networks, including the technologies, sensors and other sub-components that enable them. Given the complexity of most water problems it is difficult for solution adopters and regulators themselves to adequately evaluate all options, making it is necessary to rely on independent, science-based evidence.

VerifiGlobal's Collaborative Initiative on Water Resiliency, Adaptation and Sustainability is intended to strengthen global capacity to undertake performance benchmarking, testing and verification in the water sector, ensuring that performance reporting on water technologies and infrastructure solutions is clear, complete, objective, and useful to interested parties.

Leading organizations are increasingly demanding independent, quality-assured data on the performance of technologies, processes and products.

VerifiGlobal is committed to ensuring that these "demand-side" clients have access to high quality performance information to effectively guide their decisions.

1. Stormwater Management

Why Stormwater Technologies?

The impacts from extreme weather events (drought, flood, heat) highlight the importance of striving for a flexible and multi-dimensional approach to stormwater management while leveraging the strengths of different stormwater infrastructure designs and operational strategies.

Stormwater is the only growing source of water pollution in many watersheds throughout North America. As urban areas grow and severe weather becomes more common, the issue of stormwater management is escalating in importance. The growing issue of stormwater pollution coupled with regulatory pressure is driving the need for innovative approaches, training, technology solutions, and progressive financing.

While the challenges of stormwater management appear to be vast, overcoming them creates opportunities to make gains beyond improving water quality. There is a clear need for national leadership and collaboration to help forge the path to more sustainable stormwater management. Effective stormwater management requires collaboration among design and construction engineers, inspection and maintenance professionals, landscape architects, municipal stormwater program managers, environmental scientists, water resources managers, economists, communications specialists, decision makers and the public.

What is the Water Environment Federation (WEF) and the WEF Stormwater Institute?

The Water Environment Federation (WEF) is a not-for-profit technical and educational organization of 35,000 individual members and 75 affiliated Member Associations representing water quality professionals around the world. Since 1928, WEF and its members have protected public health and the environment. As a global water sector leader, the mission of WEF is to connect water professionals; enrich the expertise of water professionals; increase the awareness of the impact and value of water; and provide a platform for water sector innovation.

The Water Environment Federation (WEF) Stormwater Institute is a center for excellence and innovation focused on developing best-in-class solutions to stormwater runoff and wet weather issues.

The WEF Stormwater Institute focuses on addressing critical stormwater management issues as a means to protect public health and the environment. The institute serves as a conduit for information and feedback between the stormwater and regulatory communities, identifying cross-cutting issues, convening experts to tackle those issues, providing insights and leadership to policymakers, and helping chart a new course toward a healthier and more sustainable stormwater solutions. The institute benefits many stakeholder groups, including:

- Municipal agencies with responsibility for managing stormwater;
- Individual stormwater and green infrastructure practitioners;
- Technology providers;
- Academics and researchers;
- State and federal regulators; and
- Regional and state stormwater organizations.

This hub for technical information, networking, and policy advocacy expands on and leverages ongoing and proposed WEF programs. It focuses on developing technical tools, communication strategies, professional training, and networking opportunities for stormwater practitioners worldwide.

Further information:

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Stormwater Testing and Evaluation for Products and Practices (STEPP) Initiative

What is STEPP?

STEPP is the U.S. National Stormwater Testing and Evaluation for Products and Practices Initiative which seeks to improve water quality by accelerating the implementation and adoption of innovative stormwater management technologies.

STEPP fulfills its overall stormwater management objectives by:

- Removing barriers to innovation,
- Creating regulatory confidence,
- Minimizing duplicative performance evaluation efforts, and
- Establishing a common framework for testing and evaluating both public domain and proprietary stormwater control measures.

STEPP Background

STEPP started as an initiative of WEF and the U.S. Environmental Protection Agency (EPA) aiming to address the fact that the large number of stormwater regulatory requirements throughout the US act as a barrier to innovation.

The STEPP Initiative was triggered, in part, by the end of the U.S. national evaluation program for stormwater technologies, the EPA Environmental Technology Verification (ETV) program.

2012 - STEPP meeting of interested parties from regulatory agencies, product manufacturing, and consulting.

2014 - White paper released summarizing the findings of the STEPP Workgroup. The report noted that a national stormwater control measures (SCM) testing and evaluation program would be beneficial to multiple stakeholders (i.e., regulators, municipalities, technology providers, consumers).

2015 - With support from EPA, a STEPP Advisory Committee was assembled to recommend the scale, scope, funding, and leadership for a U.S. national program. The Advisory Committee used five stormwater and non-stormwater technology evaluation programs as models for the potential design components to be considered for a National STEPP Program. Additionally, two informal surveys of states and municipal separate storm sewer system (MS4) permittees assessed their needs and how they might benefit from a national program.

2016 - A feasibility report was released laying out a potential framework and policy options for the STEPP program. Findings included:

- Enhance and implement recruitment strategies through partnerships with stakeholder groups.
- Promote adoption of a national program that would evolve continually over time, allowing flexibility for both technology proponents and regulatory entities in designing a SCM study and determining how to meet specific state and local regulatory requirements.

Individual program features explored include the mission and objectives, program services, organizational relationships, operational structure, governance, funding, stakeholder engagement and transparency, testing purpose and scope, testing setting, and reciprocity.

2017 - WEF hosted meeting to further the goals of the STEPP concept by leveraging the strengths of multiple organizational partners. The result was the STEPP Consortium Group, which is led by WEF and includes:
- American Society for Testing Materials (ASTM International)
- Interstate Technology and Regulatory Council (ITRC)
- The Water Research Foundation
- Washington State Department of Ecology, University of Washington – Washington Stormwater Center, Technology Assessment Protocol – Ecology (TAPE)
- New Jersey Corporation for Advanced Technology (NJCAT) / NJ Department of Environmental Protection (NJDEP)

2018 - WEF hosted meeting that brought together key organizations, along with the WEF Stormwater Institute STEPP Work Team, to refine the roles each organization could play in the STEPP program, consider more detailed policies, and identify initial coordinating activities.

2019 - Efforts to build momentum, further develop the STEPP program initiative, and solidify partnerships are continuing to move ahead.

Further Information:

Seth Brown, Stormwater Institute Senior Advisor - seth.brown@stormandstream.com

U.S. National Municipal Stormwater Alliance (NMSA)

The National Municipal Stormwater Alliance (NMSA) is a U.S. not-for-profit alliance of state and regional groups devoted to supporting Municipal Separate Storm Sewer System (MS4) permittees. NMSA's vision is to help communities tackle stormwater challenges to provide clean water by providing a unified voice and representing MS4 permittees at the national level.

NMSA has four action areas:

- Sector Support & Information,
- Policy & Advocacy,
- Education,
- Messaging & Communication,

Following from this, NMSA is well positioned to: Connect MS4 programs and lead changes in regulation; Improve public understanding of and engagement in stormwater solutions; Promote stormwater as a resource, creating opportunities for multi-benefit and multi-use stormwater projects.

As part of Water Week 2019, NMSA and WEF outlined a long-term strategy to guide U.S. stormwater programs through the next 20 years in meeting the goals of the Clean Water Act. The strategy includes recommendations in the following areas:

1. Stormwater Infrastructure Funding – Create a technical assistance grant program (at regional or federal level) to assist communities with identifying funding resources for the construction, rehabilitation, operation and maintenance of stormwater infrastructure.

2. Stormwater Treatment System Verification - Provide funding for EPA Regions to develop a national performance verification program for stormwater best management practices (BMPs).

3. Improved Stormwater Infrastructure Needs Data Collection – Include municipal stormwater as required data to be collected through the Clean Watersheds Needs Survey and provide funds for EPA to complete the Survey.

4. Modernize NPDES Permits - Direct EPA to work with permit holders to develop incentives for development and implementation of integrated plans, as well as model permit language for watershed-based permits under the National Pollution Discharge Elimination System (NPDES).

5. Implement Source Control for Stormwater Pollution - Direct EPA to examine the authority under the Clean Water Act and Toxic Substances Control Act and other legislation as appropriate, to control pollutants in stormwater at the source, and assist states developing pollutant source control programs.

To ensure that engineered stormwater management systems are achieving their intended benefits, NMSA is advocating that better information is needed linking the performance of specific treatment system designs to their ability to remove common stormwater pollutants. Although the performance of conventional landscape-based stormwater treatment systems has been studied, system designs and study techniques vary widely. As a result, performance estimation for specific treatment systems is challenging and imprecise.

In addition, over 50 different modular stormwater management systems have been developed in recent years by private industry for use in urban environments where available land area is scarce, such as transportation corridors. These systems may be 'standalone' solutions or can be integrated into treatment trains to enhance the functionality and increase the design life of green infrastructure (GI) systems. There are several successful state and regional stormwater treatment system testing and verification programs for these systems, but adoption of results from these programs outside of their immediate jurisdictions has been limited.

NMSA believes that a national performance verification program is needed to:
- Inform and guide significant local investments in stormwater infrastructure;
- Establish a common framework for testing and evaluation of both public domain and proprietary stormwater control measures;
- Accelerate the adoption and implementation of innovative stormwater management technologies;
- Minimize duplicative performance evaluation efforts and Create regulatory confidence.

Further information:
National Municipal Stormwater Alliance
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Stormwater Equipment Manufacturers Association (SWEMA):

Advocating Performance Based Stormwater Standards and a Consistent Approach to BMP Evaluation and Acceptance

The Stormwater Equipment Manufacturers Association (SWEMA) is a leader in advocating effective solutions for stormwater quality through educational outreach to regulators, design professionals, developers and other clean water stakeholders. SWEMA is highly supportive of stormwater management strategies and regulations that incorporate advances in stormwater science, encourage innovation, and successfully protect and restore receiving waters. SWEMA also recognizes that as stormwater management continues to evolve, regulations and policies need to be refined to reflect advances in science and knowledge.

Recent trends in stormwater management have put an emphasis on the use of green infrastructure (GI) and low impact development (LID) techniques. Although both GI and LID can be highly effective tools for mitigating the impacts of stormwater runoff, care must be taken to avoid establishing prescriptive regulatory policies that accept GI and LID with little scrutiny, and simultaneously restrict manufactured treatment device (MTD) solutions that can address the unique constraints at specific sites.

SWEMA is in favor of performance based regulatory standards derived from pollutant thresholds established for protection of receiving waters. By defining performance thresholds, the best management practices (BMPs) most capable of meeting performance expectations within site-specific constraints are more likely to be considered. Of course, GI, LID, and other approaches which keep runoff onsite should be encouraged, however retaining stormwater onsite is not always feasible. Therefore, pairing GI and LID approaches with adequately vetted MTDs that can treat runoff when it can't be retained ought to be commonplace, providing maximum protection to receiving waters.

Developing a comprehensive stormwater management framework rooted in performance based standards, that evaluates and verifies the performance of all BMPs in a consistent manner and includes a clear path for acceptance of new innovative solutions should be a common goal for the environmental industry and regulators. Performance based standards ensure water quality is protected without hindering innovation or forcing development out of urban areas to undeveloped areas less prone to site constraints. Consistently evaluating and rating all types of stormwater BMPs ensures BMP comparability. Ensuring that there is a clear path to acceptance for new stormwater innovations is another way to encourage investment in stormwater research, which in turn leads to new advancements, more cost effective solutions and furthers the ultimate goal of benefitting downstream receiving waters.

Further Information:

To access the SWEMA white paper on "The Importance of Performance Based Stormwater Standards and a Consistent Approach to BMP Evaluation and Acceptance", go to:
https://www.stormwaterassociation.com/performance-based-stormwater-standards
or contact:
Laurie Honnigford, SWEMA Managing Director,
Telephone: 1-720-353-4977 -
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ISO 14034 and Stormwater Technology Verification

The ISO 14034 Environmental Technology Verification (ETV) standard was issued in November 2016. Emerging from previously funded government ETV programs, ISO 14034 establishes a framework for third-party technology verifications, based on consistency, quality and rigor. The standard is being adopted internationally, implemented by both public and private entities. It ensures credibility and reliability in the reporting of environmental performance claims. It also promotes adoption and use of innovative environmental technologies by providing technology developers, manufacturers, investors and regulators access to third-party verification of technology performance.

Innovative technologies without a track record of performance can benefit from evidence-based performance benchmarking and verification. This includes best management practices (BMPs) that address performance based regulatory standards. ISO 14034 provides a robust evaluation and performance verification process that can be consistently applied to all types of BMPs, including traditional land-based practices, manufactured treatment devices (MTDs), or green infrastructure.

ISO 14034 Stormwater MTD Verification Expertise

Using the ISO 14034 ETV standard, VerifiGlobal Alliance Members, such as GHL, TRCA and CAWT, are collaborating on performance benchmarking, testing and verification of stormwater technologies.

Important lessons are being learned regarding the technical and market challenges for acceptance, adoption and use of innovative stormwater technologies, as well as the importance of reliable measurement, analysis and feedback.

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ISO 14034 Verified Stormwater MTDs

BayFilter™ Enhanced Media Cartridge (EMC)

The BaySaver BayFilter™ Enhanced Media Cartridge (EMC), commercial unit model 545, was tested at the Mid-Atlantic Storm Water Research Center (MASWRC), under the supervision of Boggs Environmental Consultants, Inc. The performance test results were verified by Good Harbour Laboratories Inc. (GHL), following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol.

Further information:
Advanced Drainage Systems, Inc. - www.ads-pipe.com

First Defense® Oil Grit Separator

The Hydro International First Defense® Oil Grit Separator was tested by Good Harbour Laboratories Inc. (GHL), Mississauga, Ontario, Canada in 2018. The performance test results were verified by Toronto and Region Conservation Authority (TRCA), Vaughan, Ontario, Canada following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol.

Further information:
Hydro International - www.hydro-int.com

Up-Flo® Filter with CPZ™ Media

The Hydro International Up-Flo® Filter with CPZ™ Media was tested by the Engineering School of Sustainable Infrastructure and Environment (ESSIE) at the University of Florida (UF) and the Department of Civil, Construction, and Environmental Engineering (CCEE) at the University of Alabama. The performance test results were verified by Good Harbour Laboratories Inc. (GHL), following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol.

Further information:
Hydro International - www.hydro-int.com

Attend WEFTEC 2019

September 21-25, 2019 – McCormick Place, Chicago Illinois USA

www.weftec.org

Stormwater Congress Program at WEFTEC 2019

The Stormwater Congress Program at WEFTEC provides stormwater professionals from around the world the opportunity to learn from the very best thought-leaders in all aspects of stormwater management, to meet and share ideas with other professionals in the sector facing similar issues, and to gain access to the largest annual water quality exhibition in the world.

The Stormwater Congress Program encompasses all aspects of stormwater management, with:

- 4 plenary sessions and16 technical sessions in the Stormwater Management track,
- 12 technical sessions related to stormwater in the Collection Systems, Watershed, Utility Management, and Future Insights tracks,
- A workshop and mobile session specifically designed to address stormwater challenges,
- The Stormwater Luncheon,
- The Stormwater Pavilion.

Be sure to attend the following Stormwater Congress events at WEFTEC 2019:

Stormwater Luncheon
Monday, September 23, 2019 - 12:15 PM - 1:30 PM
McCormick Place | Admission fee: $40.00
Celebrating the work of stormwater professionals. Program produced by the WEFTEC Program Committee's Stormwater Symposia Subcommittee, including recognition of the National Municipal Stormwater and Green Infrastructure Award winners.

Stormwater Pavilion Receptions
Monday, September 23, 2019 - 5:00 PM - 6:00 PM
Tuesday, September 24, 2019 - 5:00 PM - 6:00 PM
McCormick Place | Booth 221, South Hall A
Companies exhibiting in the Stormwater Pavilion focus on stormwater and wet weather management products. The Pavilion includes a theater, delivering content addressing pressing aspects of stormwater management, including regulations & policies; flood impacts & mitigation; funding & financing; green infrastructure benefits; and more. Registered attendees and exhibitors are welcome to these receptions.

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Some key messages for the water industry

- ◊ Close the gaps in impact data;
- ◊ Conduct vulnerability assessments and support development and implementation of adaptation plans;
- ◊ Develop case studies on adaptation and mitigation, and share information through websites/web portals, workshops and reports;
- ◊ Take personal responsibility for being up-to-date and proactive, and become actively engaged with local water networks and associations;
- ◊ Adopt energy recovery and energy efficient technologies, and implement water loss reduction programs;
- ◊ Support evidence-based research on pollution potential and mitigation options;
- ◊ Develop collaborative partnerships with the research community and other stakeholders to foster a better understanding of the projected hydrologic impacts of climate change and its implications on the aquatic environment with respect to water quality, heat loads and decreasing biodiversity;
- ◊ Support knowledge transfer and capacity building between developed and developing countries;
- ◊ Strengthen long term, sustainable performance through improved efficiency, quality assurance and accountability.

VerifiGlobal

Creating value through informed decisions and sustainable results

2. Sensors and Advanced Monitoring

Challenges related to the extraction, delivery, and sustainable use of water create significant market opportunity to test and scale innovative water technologies and resilient solutions throughout the water cycle. Coupled to this is the application of new "smart" water tools and systems to gather meaningful and actionable data about the flow, pressure, distribution and quality of water. The combination of affordable, high quality sensors and new technologies means safer and more reliable operations for a diverse range of water/wastewater facilities and infrastructure, both centralized and decentralized, equating to more effective risk management and better informed decisions.

Sustainable water and wastewater systems must also be equipped with the capacity to be managed, monitored and networked with other infrastructure systems, in order to obtain more sophisticated, granular information on how these systems are performing and affecting each other. Additional efficiencies are gained when relevant, actionable information is shared.

Example #1 - Use of sensors and advanced monitoring technologies to minimize non-revenue water (NRW) by finding leaks quickly and predicatively using real-time SCADA data in conjunction with model network simulations. Reducing NRW allows municipalities to recover costs incurred in treatment and pumping that would otherwise be lost. One estimate indicates that a medium-sized city with 100 million gallons per day of produced water that loses 25 percent is incurring over $13 million per year in non-recoverable labour, chemical and energy expenses.

Example #2 - The sharing of watershed management and stormwater modeling information to determine probable flooding zones and times based on predictive precipitation intelligence.

VerifiGlobal and its Alliance members are committed to:

- Identifying and tracking 'smart water' sensors and advanced monitoring technologies, systems, infrastructure options, and best management practices
- Verifying and reporting on the performance of innovative sensors and advanced monitoring technologies.

Expected benefits include:

- Better integration of innovative 'smart water' sensors and advanced monitoring technologies throughout the water cycle, with significant efficiency improvements in the measurement, management and performance of technologies and infrastructure for treating, protecting and conserving water
- Posting of the verified sensors and advanced monitoring technologies on the VerifiGlobal website, creating greater market awareness and acceptance of innovative solutions that address environmental priorities
- Establishment of an inventory of verified sensors and advanced monitoring technologies that municipalities, utilities and other stakeholders can draw upon.

Contact VerifiGlobal to find out how ISO 14034 and VerifiGlobal Alliance members are supporting performance verification and market acceptance of innovative sensors and advanced monitoring technologies

Advanced Septic System Nitrogen Sensor Challenge – Update

The US EPA Advanced Septic Sensor Nitrogen Sensor Challenge (ASSNSC) provides a credible platform for sensor developers to improve and optimize their technologies. The project is continuing to provide be positive benefits, including:

- Stakeholder-driven identification and refinement of sensor performance goals;
- Further development and optimization of innovative nitrogen sensor technology performance;
- Further development and improvement of the nitrogen sensor testing Test/Quality Assurance Plan (T/QAP);
- Recognition and oversight of the Massachusetts Alternative Septic System Test Center (MASSTC) as a credible sensor test facility;
- Validation of the 'challenge model', together with the Nature Conservancy (TNC), as a mechanism to actively engage stakeholders and interested parties and to reward top performers;
- Enhanced potential for global acceptance of verified nitrogen sensor performance by following the International Organization for Standardization Environmental Technology Standard (ISO 14034 ETV).

As the project progresses from technical validation of innovative prototype sensors to verification and market acceptance of commercially viable technologies, it will remain important to continue to explore and better understand operational requirements and functionality in relation to performance expectations and the intended market deployment of these technologies.

This project is being conducted by Battelle Memorial Institute (Battelle) for the US EPA under contract #EP-C-16-014

Funding for the testing program is from the US EPA Office of Research and Development and the Office of Water/Wastewater Management.

EPA selected Battelle Memorial Institute (Battelle) to support development of a Test/Quality Assurance Plan (T/QAP) and Verification Plan, and to oversee the testing of the sensors. The T/QAP is based on the International Organization for Standardization Environmental Technology Verification (ETV) Standard - ISO 14034.

Sensor testing will be completed in 2019-20 at the Massachusetts Alternative Septic System Test Center (MASSTC), a National Sanitation Foundation (NSF) certified test facility in Barnstable, Massachusetts.

There is a screening process to determine eligibility for the six-month ISO ETV 14034 field verification test. The first level of screening was a one-week preliminary test in August 2019. The application deadline for this test was July 26, 2019. For this final round of open prototype testing, EPA will award up to $50,000 in prize money to the best performing sensor(s). Successful sensors will then be invited to the second level of screening, a one-month test in December 2019. A sensor package must successfully complete the one-month test to receive an invitation to the extensive six-month field performance test.

Battelle will verify the results of the field performance tests based on the VerifiGlobal Performance Verification Protocol and the requirements of the ISO 14034 ETV standard. EPA will award ISO ETV verification reports and statements for sensors that complete the six-month field testing and meet the minimum performance goals.

Following the release of the verification reports and statements, anticipated in 2021, an external technical panel and TNC will review the results. TNC and others are seeking funding for an order of 200 deployable septic sensor units, not to exceed a total cost of $300,000. The order may be presented in 2021 to the best performing sensor(s) completing the 6-month field performance test and meeting or exceeding the performance goals.

For more information contact
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3. Optimized Adaptive Infrastructure

Why decentralized wastewater systems?

Wastewater systems are an essential part of urban and rural communities requiring public engagement and support to ensure approval and implementation of sustainable solutions that are reliable, cost effective and environmentally sound. Information, such as building plots, roads, stormwater drainage, water supply and energy supply, are key inputs to the decision-making process. Depending on the scale of development, topography, geology, groundwater and climatic conditions, both centralized and decentralized options offer specific advantages.

Decentralized wastewater systems convey, treat and discharge or reuse wastewater from small communities, buildings and homes situated on public or private properties, or in remote areas. These systems generally treat, reuse or discharge the wastewater relatively close to the source of generation. Centralized wastewater systems are most widely used in developed or developing urban areas. They collect wastewater in large, bulk pipeline networks, transporting it long distances to one or more treatment plants.

A primary difference between decentralized and centralized systems is the collection and conveyance process. In decentralized systems the treatment and disposal or reuse of the wastewater is close to the source of generation. This reduces the conveyance requirement, in some cases to one pipe. By contrast, a centralized wastewater system is usually extensive and spread out involving different collection and conveyance methods.

Decentralized wastewater systems can provide viable, cost-effective alternatives for upgrading or retrofitting existing conventional centralized system systems. Decentralized applications may also be necessary in cases, where centralized infrastructure is not yet ready or scheduled for construction. In many places, infrastructure development (roads, water supply, wastewater collection and drainage systems) may take place years after initial development has occurred. Therefore, decentralized wastewater facilities are necessary to protect public health and environmental quality.

A feature of advanced onsite decentralized systems is the capacity for flow separation or source separation, which segregates different types of wastewater, based on their origin, such as blackwater, greywater and urine. This approach requires separate plumbing systems to convey the segregated flows for different levels of treatment and handling, thereby enhancing the safe reuse and disposal of the end products.

The development of new on-site treatment technologies allows for decentralized solutions, which are technically and aesthetically sound and acceptable to stakeholders. Many different combinations and variations of treatment systems are possible. In many developing countries, decentralized wastewater treatment technologies have been promoted due to the potential for lower capital, operation and maintenance costs.

Types of decentralized wastewater systems

Based on the size and characteristics of the served area, different types of decentralized wastewater systems can be considered:

Effluent infiltration

Effluent infiltration systems are usually applied at the onsite level and are generally adequate because of the low quantity of wastewater generated. However, they require suitable soil conditions to permit infiltration of the excess water. These systems also require a low ground water table and, if not applied properly, the discharged effluent may become a source of ground water pollution. Septic tanks are the most common on-site treatment technology used, which can be applied successfully where an adequate water supply is available and soil/groundwater conditions are suitable.

Ecosystem purification

Systems incorporating ecosystem purification require significant surface area, due to the slow pace of the biological processes involved. Because the rate of the purification process is temperature dependent, these systems are generally more suitable for warmer climates. Systems incorporating biological processes are generally more resilient to fluctuating loads and do not require complex maintenance and operation. Constructed wetlands are generally more suitable for applications at the onsite or neighbourhood level, while stabilization ponds offer a viable alternative at the level of small towns or rural communities.

Engineered treatment

Small-scale engineered wastewater treatment facilities apply technologies similar to medium or large wastewater treatment plants. For onsite decentralized applications, compact package plants are often used with different compartments for each of the different unit treatment processes. The design and operation of small treatment plants at the neighbourhood or onsite level present significant challenges due to flow fluctuations, the need for specialized operation and maintenance, and the relatively high per capita costs.

Regulatory considerations

Water pollution regulations in the form of legislation documents, guidelines or ordinances prescribe the necessary level of treatment, so that the treated effluent meets the requirements for safe disposal or reuse. Effluent may be discharged into a natural water body or infiltrated in the ground. Regulations also include requirements for the design and operation of wastewater systems, as well as the penalties and other measures for their enforcement. Centralized systems are designed, built and operated in order to fulfil the existing regulations. Their management usually is executed by local authorities.

In the case of decentralization at on-site level and clusters of buildings, the entire wastewater system is usually located within private premises. Therefore, the design, construction, operation, maintenance and costs are typically the responsibility of the owner. In many cases specialized companies might be contracted for the operation and maintenance. The local authorities issue permits and may provide support for the operation and management in the form of collecting wastes, issuing certificates/licenses for standardized treatment equipment, or for selected qualified private companies.

From regulatory point of view, the control of the quality of treated effluent for reuse, discharge or disposal is the responsibility of government authorities. This can be a challenge if a large number of systems must be controlled and inspected.

Most often the operational problems are associated with clogging of the treatment facilities as result of irregular removal of the sludge or hydraulic overloading due to increased number of people served or increased water consumption. It is in the owner's interest to operate and maintain the system properly, especially in the case of reuse of the treated effluent.

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cawt

Fleming College's Centre for Advancement of Water and Wastewater Technologies (CAWT), a Canadian VerifiGlobal Alliance member, has inaugurated a field testing facility in Ontario that specializes in providing third-party testing, verification and certification services to manufacturers of advanced onsite residential wastewater treatment technologies. The new facility can accommodate up to six technologies concurrently, allowing companies to guarantee the claims about the quality and performance of their products and ultimately setting them apart from their competitors.

The need for advanced onsite septic system testing, verification and certification services is well-established and growing in Canada, where large segments of the population reside in rural or remote settings that are not connected to municipal sewage services. When, for various reasons, a property cannot accommodate a conventional septic treatment system, advanced onsite technologies are put in place to filter and disinfect household wastewater before it is returned to the environment. The increasingly stringent regulatory framework around wastewater effluent quality and drinking water protection at all levels of enforcement has been a primary driver of the push for certification services. This same regulatory climate is also driving leaders in the wastewater industry to foray into the advanced onsite residential septic system market where they can innovate ways to improve the effectiveness of septic technologies: advanced units provide more reliable treatment, additional groundwater protection, and significantly reduce the need for pump-outs.

At this time, the CAWT's new facility is one of only a handful of its kind in Canada designed to offer testing and verification services , as well as certification under the CAN/BNQ 3680-600 standard, which is intended to ensure that advanced onsite systems can perform under the duress of cold conditions.

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The Massachusetts Alternative Septic System Test Center (MASSTC) was established by the Barnstable County Department of Health and Environment in 1999 as part of a coastal zone management initiative to address accelerated eutrophication and nuisance algae blooms in the marine environment caused by nitrogen from septic systems. Searching for technologies to address the issue, MASSTC began working with the U.S. Environmental Protection Agency (EPA) and the National Sanitation Foundation (NSF) of Ann Arbor Michigan, to develop a nutrient testing protocol and refine nutrient standards, which in 2007 resulted in the NSF Standard 245. MASSTC has conducted testing on over 30 leading technologies and today continues to conduct research, development and testing of products that remove the myriad of contaminants found in domestic wastewater.

The MASSTC facility can accommodate over 20 concurrent tests, allowing companies to conduct research and development on their products or complete any number of standardized test protocols. In addition to technology and product testing, MASSTC conducts research on questions relating to pathogen transport, removal of pharmaceuticals and personal care products, and a range of other topics. Examples of projects include:

- Protocol for testing alternative drainfield products incorporating use of specified media
- Pharmaceuticals, endocrine disruptors and personal care products attenuation in onsite septic system drip dispersal systems
- Investigation of soil types and the removal of PPCPs from septic tank effluent
- Investigation of the feasibility of using Yeast Estrogen Screen (YES) for the rapid determination of endocrine disruption potential
- Removal of selected pharmaceuticals and personal care products (PPCP) using shallow low-pressure distribution systems.

Further information:

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Value-based procurement and life cycle costing

Relying only on capital cost as the principal criterion for procurement often means that the procurement award goes to the lowest bidder, without consideration of the costs of procurement, operation and maintenance, as well as any other costs incurred over the expected life of the asset.

A more responsible and sustainable alternative is value-based procurement which incorporates life cycle costing to evaluate the total cost of ownership in the context of performance, reliability and indirect impacts, as well as other considerations, such as post procurement support by the solution provider.

Public and private organizations can obtain the greater value from their procurement practices by implementing value-based procurement. Value-based procurement means going beyond “lowest bidder” to weigh in factors such as long-term value, evolving technologies, customer service, and design aesthetics. Implementing value-based procurement also encourages innovation.

Based on this, the Water and Wastewater Equipment Manufacturers Association (WWEMA) has been advocating for governments and private entities to use value-based procurement methods to ensure the best use of their water and wastewater capital budgets.

WWEMA has informed, educated, and provided leadership on issues that shape the future of the water and wastewater industry since 1908. WWEMA member companies supply the sophisticated leading-edge products and technologies, offering solutions to water-related environmental problems and societal needs.

Further information:

info@wwema.org
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4. World Economic Forum - "Fourth Industrial Revolution for the Earth"

What is the World Economic Forum?

Established in 1971 as a not-for-profit foundation and headquartered in Switzerland, the World Economic Forum is an independent international organization focused on public-private cooperation and entrepreneurship. World Economic Forum activities and initiatives bring together people who have the drive and the influence to make positive change in the global public interest.

What is the Fourth Industrial Revolution?

Issues such as climate change, unsafe levels of air pollution, depletion of fishing stocks, toxins in rivers and soils, overflowing levels of waste on land and in oceans, and loss of biodiversity and deforestation are negative consequences of industrialization. As innovations gain momentum and become more widely accessible, technology is becoming increasingly connected. With convergence of the digital, physical and biological realms, emerging technology platforms, including the "internet of things" (IoT), virtual reality (VR) and artificial intelligence (AI) are enabling societal shifts by impacting economies, values, identities and possibilities for future generations.

The World Economic Forum defines this "Fourth Industrial Revolution" as an opportunity to address environmental issues and transform how we manage our shared global environment. However, these same trends could also exacerbate existing threats to environmental security and/or create entirely new risks that will need to be managed. Harnessing these opportunities and proactively managing these risks requires a transformation of enabling conditions, including governance frameworks, policy protocols, investment and financing, technology development and effective societal engagement. This transformation will not happen automatically, requiring proactive collaboration among policy-makers, scientists, civil society, technology champions and investors.

The World Economic Forum "Fourth Industrial Revolution for the Earth" is a publication series that highlights opportunities to solve the world's most pressing environmental challenges through technological innovations supported by new and effective approaches to governance, financing and multi-stakeholder collaboration. It offers insights into emerging opportunities and risks, highlighting the roles and responsibilities for these technologies to be harnessed and scaled effectively.

The Fourth Industrial Revolution and Water

"Harnessing the Fourth Industrial Revolution for Water" was published in September 2018 as part of the World Economic Forum "Fourth Industrial Revolution for the Earth" publication series. The report explores solutions for the water sector, with the aim of accelerating adoption and rapid expansion of competitive choices, new investment into innovation and potential leapfrogging to solve 21st-century water challenges.

The World Economic Forum initiative is timely as the world transitions from believing that water was plentiful and free (or inexpensive) to facing the impacts of water scarcity, poor water quality and the variabilities of hydrologic events from climate change. What the world is now experiencing can no longer be framed as "normal". The past can no longer be used to predict seasonal weather events and precipitation. There is a pressing need for new public policies and business strategies as well as for innovations in technology, financing and partnerships. These developments will be possible only with better-quality and more accessible data, and the creation of more useful information.

Digital technologies such as connected devices (IoT), predictive analytics and artificial intelligence are emerging as powerful tools in achieving sustainable, resilient and equitable access to water. Opportunities include the potential of harnessing the power of remote sensing to provide vastly improved predictions of droughts and flooding, real-time monitoring of water quantity and quality within watersheds, improved water-utility asset management, off-grid and localized solutions coupled with "frictionless" water-trading platforms.

You can learn more at:

https://www.weforum.org/reports/harnessing-the-fourth-industrial-revolution-for-water

VerifiGlobal and the VerifiGlobal Alliance

VerifiGlobal: c/o ETA-Danmark A/S, Göteborg Plads 1 DK-2150 Nordhavn - www.verifiglobal.com

Forthcoming events

Over the next year VerifiGlobal Alliance members will be participating in a number of key events to promote and build greater confidence in the application of ISO 14034 ETV verification.

September 2019	- Water Reuse Symposium 2019, San Diego USA, 8-11 September 2019 - Horizon 19 Clean Economy Conference, Boston USA, 19-20 September 2019 - WEFTEC, Chicago USA, 21-25 September 2019
October 2019	- World Water-Tech North America, Los Angeles USA, 29-30 October 2019
November 2019	- Aquatech Amsterdam 2019, Amsterdam Netherlands, 5-8 November 2019 - US EPA Advanced Septic System Nitrogen Sensor Challenge Webinar (TBD), Fall 2019 - SRI Sustainable, Responsible and Impact Investing Conference, Colorado Springs USA 11-15 November 2019
January 2020	- Cleantech Forum, San Francisco USA, 27-29 January 2020
February 2020	- GLOBE Forum, Vancouver Canada, 10-13 February 2020 - World Water-Tech Innovation Summit, London England, 25-26 February 2020
March 2020	- TRIECA Stormwater and Erosion Control Conference, Toronto Canada, 25-26 March 2020 - Sustainability Summit 2020, London England, 26 March 2020 - WEF Residuals and Biosolids Conference, Minneapolis USA 31 March – 03 April 2020
April 2020	- WEAO Technical Symposium and OPCEA Exhibition 2020, Toronto Canada, 26-28 April 2020
May 2020	- Blue Cities Forum 2020, Toronto Canada, 7-8 May 2020 - 12th International Conference on Remediation of Chlorinated and Recalcitrant Compounds Portland Oregon USA, 31 May 31- 4 June 2020
June 2020	- ACE 2020 American Water Works Association Conference and Exposition, Orlando USA, 14-17 June 2020 - TechConnect World Innovation Conference and Expo, National Harbor Maryland USA, 29 June – 01 July 2020 - Sustainability Research & Innovation 2020, Brisbane Australia, 14-17 June 2020

Understanding Verification and Certification

Certification is essentially a “pass or fail” determination of performance against a predetermined standard. Verification is a confirmation of the actual performance through independent third-party testing. It provides evidence of actual performance that can be used to support decisions.

The ISO 14034 ETV standard outlines the process for conducting independent verification of environmental technologies and is particularly well-suited for addressing the contextual challenges of environmentally sound technologies (i.e., it allows the technology adopter to establish a performance benchmark given the context for the technology application and the adopter’s own circumstances; and/or it allows the technology proponent to demonstrate that its technology performs better than existing standards).

ISO 14034: Environmental Technology Verification (ETV)

VerifiGlobal

Creating value through informed decisions and sustainable results

Information about Environmental Technology Verification (ETV) and the ISO 14034 ETV Standard

Interest in ISO 14034 ETV is growing!

The Head of Standards Development at ISO recently provided the World Trade Organization (WTO) Committee for Trade and Environment with an update on ISO standards, including the ISO 14034 Standard and the new ISO 14035 Technical Report.

Some regional and national ETV Programs currently exist with lists of verified environmental technologies. You can find out more at the following websites:

European Commission - https://ec.europa.eu/environment/ecoap/etv/verified-technologies_en

Denmark – http://www.etv-denmark.com

France - http://www.verification-etv.fr/quelles-sont-les-technologies-verifiees-etv-en-france,15.htm

Poland - https://etv.ietu.pl/en/about-us/

Japan - https://www.env.go.jp/policy/etv/en/index.html

Korea - http://www.keiti.re.kr/site/eng/02/1020105000000020181213 06.jsp

Canada and the US terminated their ETV programs in anticipation of the new ISO 14034 standard which was published in November 2016.
You can review information on these two programs and the technologies verified at the following websites:

Canada – https://etvcanada.ca/home/verify-your-technology/current-verified-technologies/

US - https://archive.epa.gov/nrmrl/archive-etv/web/html/

With the establishment of the ISO 14034 ETV standard, the market for performance testing and verification services is now more open, flexible and bottom-up (i.e., driven by a standard process for verification versus a governmental top-down program), which is one of the reasons why the VerifiGlobal Alliance was established, with 12 technical performance testing and verification organizations in 8 countries (Australia, Canada, Denmark, Finland, France, Korea, Poland and United States) and growing.
You can review information on VerifiGlobal and the technologies verified at the following website:

VerifiGlobal - http://www.verifiglobal.com/en/solutions-network/network-members

Other jurisdictions using or exploring application of the ISO 14034 standard include the following:

The Government of Bangladesh used the ETV process as a platform for the selection of affordable arsenic mitigation technologies for rural communities. You can find out more at -http://bicn.com/acic/resources/arsenic-on-the-www/safewater.htm

The Confederation of Indian Industry and the India Green Business Council have a “Performance Challenge for Green Built Environment”. You can find out more at - https://igbc.in/igbc/

China is continuing to show interest in environmental technology verification particularly now that the ISO 14034 standard has been published. You can find out more at -http://english.mee.gov.cn/Resources/standards/

In June of this year a new ISO Technical Report, “ISO/DTR 14035 Environmental technology verification - ETV - Guidance to implement ISO 14034”, was approved by the following countries: Argentina (IRAM), Austria (ASI), Brazil (ABNT), Canada (SCC), China (SAC), Costa Rica (INTECO), Cuba (NC), Czech Republic (UNMZ), Denmark (DS), France (AFNOR), Hungary (MSZT), Ireland (NSAI), Japan (JISC), Korea, Republic of (KATS), Malaysia (DSM), Malta (MCCAA), Mauritius (MSB), Mexico (DGN), Mongolia (MASM), Nigeria (SON), Norway (SN), Pakistan (PSQCA), Panama (COPANIT), Philippines (BPS), Poland (PKN), Serbia (ISS), Sri Lanka (SLSI), Switzerland (SNV), Thailand (TISI), and United States (ANSI).

Various entities and philanthropic organizations are using the process under the ISO 14034 standard to support technology challenges, including the Carbon X-Prize and the US EPA Advanced Septic System Nitrogen Sensor Challenge.
You can find out more at the following websites:

Carbon X-Prize - https://carbon.xprize.org/prizes/carbon

US EPA - https://www.epa.gov/innovation/advanced-septic-system-nitrogen-sensor-challenge-phase-ii-prototype-testing

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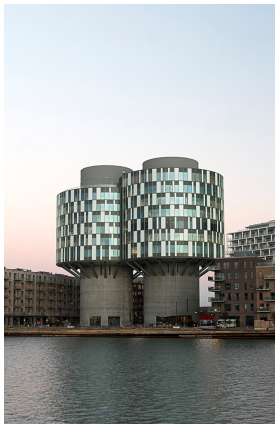
VerifiGlobal is a global network of organizations providing testing and verification services across multiple sectors and areas of expertise. Its mission is to strengthen long term, sustainable performance through improved efficiency, quality assurance and accountability.

The VerifiGlobal Alliance includes 12 member organizations from 8 different countries.

Current VerifiGlobal member organizations are: Battelle (USA), CAWT (Canada), CMI (Australia), ETA-Danmark (Denmark), Eurofins (Finland), GHL (Canada), IETU (Poland), KTL (South Korea), MASSTC (USA), RESCOLL (France), Southern Research (USA), TRCA-STEP (Canada).



VerifiGlobal Alliance members demonstrate their conformity with the requirements of ISO 14034 and ISO 17020 through a peer assessment process designed in accordance with the requirements of ISO 17040.

The VerifiGlobal peer assessment process provides a flexible mechanism for recognizing competent organizations in countries that do not yet have a national accreditation program for ISO

ETA-Danmark A/S, a subsidiary of Danish Standards, hosts the VerifiGlobal Secretariat.
Accredited by Danish Accreditation (DANAK) in accordance with ISO 17020, ETA-Danmark is the Danish verification body for both ISO 14034 ETV and the EU ETV Pilot Programme.
For information on ETA-Danmark, contact Thomas Bruun: tb@etadanmark.dk

For more information on VerifiGlobal, go to: www.verifiglobal.com