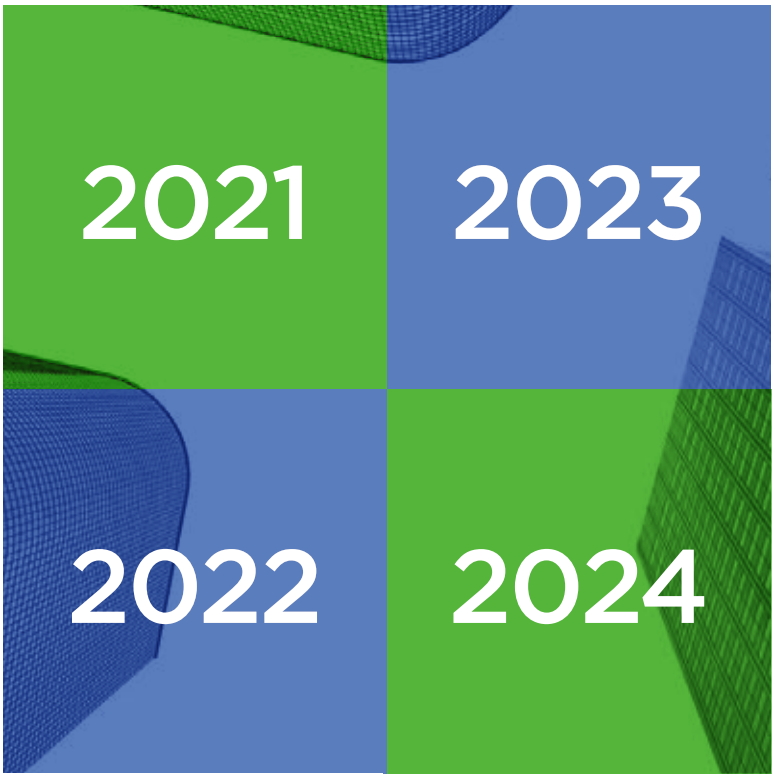
Activity Report



Efficiency Valuation Organization

IPMVP® INTERNATIONAL PERFORMANCE MEASUREMENT & VERIFICATION PROTOCOL

CONTENTS

MESSAGE FROM THE CHAIRMAN

In 2021, EVO celebrated the 20th anniversary of its incorporation and the 25th anniversary of the International Performance Measurement and Verification Protocol (IPMVP). These are significant milestones in an organization's life and highlight the relevance of EVO's mission and the IPMVP as the world's leading protocol for measuring and verifying energy savings.

After so many years, it is always interesting to reflect on our past successes and look forward to the next 25 years. The IPMVP is not technically disputed; it's the best product in the market for its purpose. However, as the caretaker of the protocol, EVO must continually review and assess whether the communication approach regarding the IPMVP is aligned with the current market needs and trends and how it could play a bigger role in the global energy efficiency and decarbonization agenda.

A clear vision for the future requires knowing our market and being cognizant of the changing dynamics of the demand for energy efficiency implementation and M&V products. It is crucial to have a solid understanding of the current and potential customer base and the issues they face. Answering questions such as what the role of M&V is in the decarbonization agenda and how we best position EVO to provide relevant products and services is an essential part of our activities.

Forward-looking considerations for the sustainable development of EVO's market opportunities must rest on the consolidation of existing services with existing partners while extending well-established products in new markets and extending further services and products through existing partners. To be and remain efficient in our products and services development, we must deploy resources and partnerships strategically and set the correct outreach targets.

This is why the board of directors and staff met in Montréal in July 2022 for a strategic planning meeting. The timing for such an exercise was excellent as we were still adapting to the challenges resulting from COVID-19 and a significant shift in our business model.

Being a seasoned organization allows us to learn from past and recent experiences and adapt as needed. This is precisely what we did in Montréal. We explored important questions regarding market opportunities and how to best communicate our vision and mission to key stakeholders.

We discussed extensively about strategic orientations and how to bring them to the operational level. What stood out was the size and scale of the opportunity compared to our resources. However, we successfully defined what was realistic and what could be delivered efficiently and meaningfully.

Mark Lister

The present report reflects some important outcomes resulting from our strategic planning discussions. It illustrates very well how our staff, volunteers, and partners articulated and translated into clear actions some of the critical goals and objectives set by the board.

To remain relevant, an organization must not rest on the laurels of its past success. EVO has demonstrated that it is agile in its operation. Transparent and respectful in its partnerships. Professional in its product delivery.

In closing, I would like to thank our executive director, staff, board of directors colleagues, organizational supporters, and all our volunteers for their tireless efforts. Without them, EVO would not be such a strong and impactful organization.

MESSAGE FROM THE EXECUTIVE DIRECTOR

When I discuss with peers in the energy efficiency and decarbonization industry, I often need to explain what EVO does. The short answer is that we develop measurement and verification (M&V) protocols, organize training, and deliver professional certifications. Nothing very exciting at first sight. And usually not a topic on which to start a lively discussion.

But when I go a bit deeper into the description of EVO, I add that we work with nearly one hundred M&V specialists and experts and more than twenty training partners worldwide, that we maintain and adapt the International Performance Measurement and Verification Protocol, the IPMVP, the world's most recognized and valued measurement and verification protocol, that is has been republished eight times since its inceptions, translated over the years in over 22 languages, and referred to in government and utility programs, regulations and legislation. This is a more comprehensive description of who we are and what we do.

The years 2021 to 2024 were difficult for many organizations worldwide, mainly due to the numerous challenges resulting from COVID-19. When your business model is based on in-class training, and people are limited in their whereabouts, you must adapt rapidly. Our partners did that during the first phase of the pandemic in 2020, and we kept adapting throughout 2021 to become 100 % virtual for our training and certification activities.

From every crisis emerges an opportunity. When this happens, the key challenge for an organization is to act swiftly, with rigor and determination, not letting others dictate what you should do and how. Working cooperatively with the right partners, you adapt and then do things differently and better. This collaborative approach ensures that all stakeholders are part of our success.

In the past four years, we initiated a full review of our flagship product, the IPMVP. This included a worldwide consultation with our training partners, instructors, and dozens of the 19,000 professionals and experts trained to the IPMVP standard in the past two decades. This major exercise culminated with the IPMVP Core Concepts (EVO 10000:1-2022) release in March 2022.

As described in this report, nine IPMVP sub-committees focus on elaborating thematic IPMVP application guides. These guides delve deeper into various aspects of M&V best practices and technical guidelines. The development of many of these guides accelerated from 2021 to 2024, and we should see them published in the coming months and years.

Denis Tanguay

We faced a strong and unexpected headwind in late 2021 on the training and certification front. In consultation with our partners, we developed two new certification programs for M&V professionals, the PMVA and PMVE. These programs were designed to address the expected rigor of the IPMVP users and were accomplished in less than three months, thanks to the strong commitment of our stakeholders.

What was initially seen as an insurmountable problem became a tremendous opportunity to create new products and services fully aligned with the IPMVP. This also allowed EVO to oversee every step of the certification process, from the training material development, the accreditation of instructors, the elaboration of certification exams, and the deployment of certification and re-certification criteria reflecting the market needs – eliminating in the making, many irritants and barriers inherited from the previous programs.

Ultimately, all of EVO's training partners, but a few, chose to retain their relationship with EVO and deploy the PMVA and the PMVE in their respective markets. The initial response was solid and has grown every single year since then. This positive response gives us optimism about the future. Over the period, we welcomed new training partners helping deploy the IPMVP in new markets.

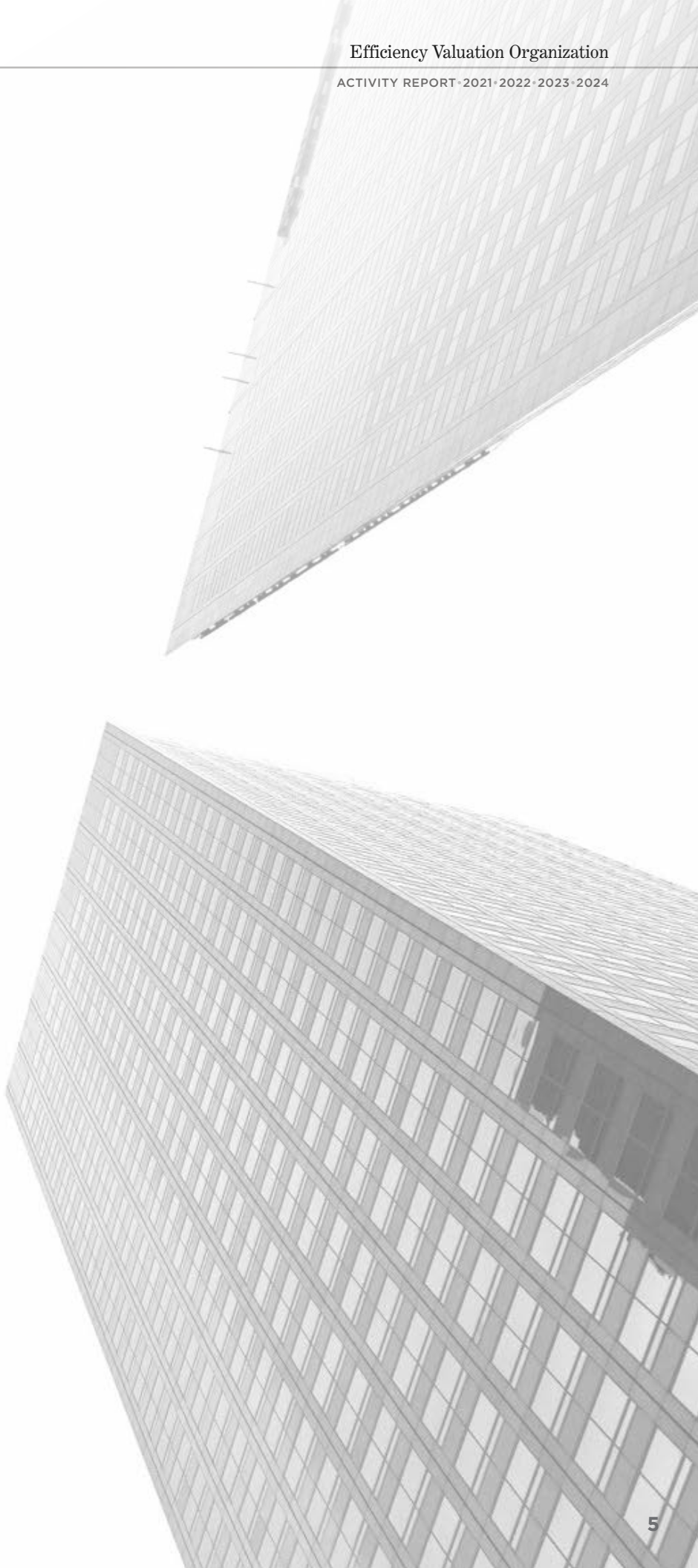
Dormant for a decade, we also updated the International Energy Efficiency Financing Protocol, the IEEFP. We also put together an IEEFP committee to promote using the IPMVP M&V framework, options, and principles in the financial community and bridge it with ESG and decarbonization considerations. This committee released a white paper on energy efficiency financing in late 2023.

Working with partners in Canada and Mexico, we also developed and piloted an extensive training and certification program based on the IEEFP and the IPMVP. The first cohort of trainees will receive their certificate in early 2025.

EVO staff and volunteers actively pursued awareness activities on the communication front, as witnessed by the extensive list of articles, workshops, webinars, conferences, and master classes listed in this report.

In retrospect, 2021 to 2024 was far from being quiet and boring. It was a period of challenges but also tremendous opportunities to develop and deploy new M&V products and services to serve the energy efficiency and decarbonization community better worldwide.

I thank our board of directors for showing strong leadership in complex and exciting times—a world of thanks to my EVO staff colleagues, our volunteers, instructors, and training partners. Your collective efforts to make stakeholders and decision-makers aware of the IPMVP are fully reflected in the many activities described in this report.



OUR TRAINING PARTNERS

AEPV
afnor COMPÉTENCES
Alliance for an Energy Efficient Economy
AMENEER
energy efficiency COUNCIL
energylab
eeVs
ESTA
FIRE FEDERAZIONE ITALIANA PER L'USO RAZIONALE DELL'ENERGIA
HKAEE 香港能源工程師學會 Hong Kong Association of Energy Engineers
ivees | Independent Verifiers of Energy Efficiency Savings
Ibecca
KAESCO
kfq Korean Foundation for Quality
台灣綠色生產力基金會 Taiwan Green Productivity Foundation
PBJ TECH HUB
SEAS Sustainable Energy Association of Singapore
SENAI Serviço Nacional de Aprendizagem Industrial
Tecnológico de Monterrey
Thai ESCO Association สมาคมบริษัทจัดการพลังงานไทย

OUR ORGANIZATIONAL SUPPORTERS

BC Hydro Power smart
BONNEVILLE POWER ADMINISTRATION
ieso Connecting Today. Powering Tomorrow.

GOVERNANCE

BOARD OF DIRECTORS (AS OF DECEMBER 31, 2024)

EVO's Directors are selected with the objective of securing Directors representing a geographic and demographic cross-section of users of EVO Protocols.

Chair
Mark Lister
Australia

Treasurer
Thomas K. Dreessen
Indonesia

Secretary
Laura Van Wie McGrory
United States

Vice Chair
Donald Gilligan
United States

Member
Phil Coleman
United States

STAFF

EVO's day-to-day operations are performed by staff located in Montréal (Canada), Mexico City (Mexico) and Sofia (Bulgaria) with complementary administrative, legal and accounting resources in Washington DC (United States).

Denis Tanguay
Executive Director
Canada

Desislava Borisova
Training Director
Bulgaria

Monica Perez Ortiz
Director of Programs
Mexico

AT A GLANCE

2021

2021 marked the 25th anniversary of the first version of the IPMVP and the 20th anniversary of EVO. Reaching such important milestones is a testimony to the work done by EVO volunteers over the years and translated in 2021 with the release of many new documents and communications tools.

PUBLICATION OF AN UPDATED INTERNATIONAL ENERGY EFFICIENCY FINANCING PROTOCOL (IEEFP)

The year 2021 started with a long-awaited update of the IEEFP. The IEEFP was initially developed in 2009 through an EVO-sponsored United Nations project. A broad group of energy efficiency and finance experts met to discuss barriers to funding energy efficiency projects. A consensus was reached that a financing protocol could bridge the gap between funding sources and their financing of energy efficiency projects.

The objective of the IEEFP is the successful scaling up of investment in building energy efficiency projects through improving the ability of project developers to unlock funds from private banks and investment funds. The IEEFP provides a simple and easily understood framework for credit officers to facilitate their understanding of the key elements needed to evaluate and offer attractive loans to building owners, energy services companies, and other potential developers and implementers of energy efficiency projects.

The update of the IEEFP and the accompanying training program's development was made possible by a financial contribution from the Government of Canada's Department of Natural Resources. As part of the project, EVO developed a specific annex reflecting Canada's regulatory environment.

In June, in cooperation with GIZ, NAMA Facility, and AMENEER, EVO conducted an IEEFP pilot training program in Mexico. More than 20 participants from Mexico and other countries in Latin America attended the program. An IEEFP country annex was also released to complement the IEEFP, which was translated into Spanish.

IPMVP SUBCOMMITTEE ON OPTION D

Early in the year, the IPMVP committee announced the creation of a subcommittee on Option D. EVO identified the need for guidance on applying the IPMVP Option D and decided to establish an IPMVP Subcommittee to address the needs. Paul Calberg-Ellen from France chairs this subcommittee

The main objective of this subcommittee is to exchange and discuss the practical field experience of each member as well as the theoretical/academic aspects to lead to the drafting of a guide for option D. Subcommittee focus area includes data requirements, constraints, feasibility of calibration, steps for model checking and validation, process of implementation, in relation with contract constraints (EPC), etc.

WHITE PAPER ON THE IMPACT OF COVID-19 ON M&V

M&V efforts faced significant challenges from the COVID-19 pandemic due to shifts in energy use at facilities, impacting the accuracy of energy savings estimates. Projects using meter-based M&V methods were directly affected by changes in energy consumption, which skewed estimated savings (i.e., including COVID-19 savings or COVID-19 penalties).

In the context of M&V, these unexpected changes in site-level energy consumption are non-routine events (NREs), which, if significant, necessitate making non-routine adjustments (NRAs) as detailed in the *IPMVP Application Guide on Non-Routine Events & Adjustments (IPMVP NRE/A Guide)* published by EVO in October 2020.

Elaborated mainly during 2020, EVO released in April 2021 a white paper entitled *Impacts of COVID-19 on Measurement and Verification (M&V) of Energy Savings: Options for Meter-Based Methods – IPMVP and Beyond*. This white paper followed the publication of two articles in the March 2021 issue of M&V Focus.

All M&V efforts at sites whose energy use is significantly impacted by COVID need to ensure reported savings are not adversely affected by changes resulting from COVID. Given the level of judgment inherent in making NRAs and the complexities introduced by COVID-19's ongoing and changing impacts, this paper provides more focused guidance on managing the effects of the pandemic when using meter-based M&V.

COMMUNICATIONS

EVO is a global M&V think tank that creates tools to help the energy efficiency industry measure and verify savings. In 2021, EVO announced two new communication activities. In April, EVO announced that a new blog dedicated to M&V of energy savings was put online.

This new forum is for individuals and organizations interested in the M&V of energy and water savings. The purpose is to provide a public space to discuss the role of M&V from different perspectives but with a strong bias toward policy and financial topics. All EVO partners, instructors, committee members, and EVO web subscribers were invited to guest blog on this forum.

The *EVO Blog* complements the popular online magazine M&V Focus, which presents technical articles and extended case studies. In 2021, two issues of M&V Focus were published in March and November.

In June, EVO announced the launch of M&V Week, which will be held annually in October. The Efficiency Valuation Organization hosts M&V Week and showcases activities organized in individual countries to promote energy efficiency measurement and verification. The events and activities highlight the importance of project-level M&V as prescribed by the IPMVP. Held yearly since 2021, M&V Week is an awareness gathering place for policymakers, investors, building owners, utilities, and energy efficiency program designers.

2021

2022

NEW TRAINING AND CERTIFICATION PROGRAMS

2022 started with major announcements for EVO and the international M&V community. On February 8, EVO announced the creation of two IPMVP certifications for M&V professionals.

- *Performance Measurement and Verification Analyst – PMVA*
- *Performance Measurement and Verification Expert – PMVE*

The **PMVA** is the primary standard for individuals applying IPMVP M&V concepts to energy efficiency projects. The PMVA certification builds on the *M&V Fundamentals and IPMVP* training curriculum owned and deployed by EVO since 2009. Over 15,000 individuals took this course before 2022, with alums in more than 60 countries.

The **PMVE** is an advanced IPMVP M&V certification and is the primary standard for individuals preparing or analyzing measurement and verification plans. The PMVE program builds on the knowledge acquired through the PMVA *M&V Fundamentals and IPMVP* training and advanced training obtained by taking the EVO's *M&V Planning in Practice* course.

The new programs were effective on the announcement date and released simultaneously in English, French, Spanish, Portuguese, and Italian. More information is found in this activity report's training and certification section.

The *Federazione Italiana per l'uso Razionale dell'Energia (FIRE)* delivered EVO's new *Performance Measurement and Verification Expert (PMVE)* training to a highly engaged group of students from all over Italy. Thanks to the co-chair of EVO's M&V Fundamentals Committee, Daniele Forni, for this significant step forward.

Thanks to the incredible work done by our training committee under the leadership of Bruce Rowse, we have also successfully deployed our PMVE training in many other countries, including the United States, Australia, Brazil, the UK, Turkey, France.

EXPANSION OF THE TRAINING PARTNER NETWORK

Through a network of national, regional, and international training partners and organizers, EVO has introduced M&V training and professional certification in several countries in the previous 15 years.

Over these years, M&V certification was delivered by a third party in conjunction with EVO using EVO-owned training material based on the EVO-owned IPMVP Protocol, with EVO-trained, mentored, and accredited instructors. In the program, individuals were tested on an exam co-owned by EVO and designed mainly by EVO IPMVP Committee members and EVO-accredited instructors.

The launch of the new certification programs in early 2022 finally gave EVO the full autonomy necessary to ensure that the training and certification of M&V professionals would continue to reflect the highest standards and guarantee the alignment with the IPMVP Core Concepts and other relevant IPMVP application guides.

The program launch was successful, as witnessed by the signing of training partner agreements with over a dozen organizations worldwide. All former EVO training partners, except for two under the previous training and certification scheme, renewed their agreements and confirmed their willingness to continue promoting the IPMVP.

To further expand the market to support these new EVO training and certification programs and other advanced M&V-related training programs, EVO released a call to express interest in new partners in early 2022. Since then, many new partnerships have been signed, reinforcing the network of national training organizers and national training delivery partners.

RELEASE OF THE IPMVP CORE CONCEPTS 2022

After intensive consultation, the IPMVP Committee released an expanded version of the IPMVP Concepts in early 2022. This publication represents a five-year statutory review process that gathered input from the IPMVP's Technical and Training Committees, EVO's approved instructors, and many other stakeholders worldwide. Hundreds of individual comments were received, analyzed, and discussed with the perspective of either inclusion into the IPMVP Core Concepts or in one of many IPMVP existing or upcoming application guides.

OTHER ACTIVITIES

In addition to announcing the launch of our new programs, we successfully held the second edition of M&V Week in October, and M&V Focus Issue No. 10 was put online in October.

In July, EVO board members and staff met in Montréal and conducted a two-day strategic planning session. This event was an excellent opportunity to think and discuss the accomplishments of the previous two decades and reaffirm EVO's vision and mission.

Participants discussed the many challenges faced by the organization following two difficult years dealing with the impact of COVID-19 on our EVO's activities, including the importance and relevance of EVO's new programs in the markets.

With changes adopted in 2022, EVO gained complete independence and flexibility on how the IPMVP training and certification activities are coordinated and deployed worldwide. These changes represented fresh air that simplified EVO's relationship with its partners. They also greatly facilitated our capacity to build new relationships and engage in broader policy, regulatory, and program discussions based on respect, transparency, and honest cooperation.

2022

2023

2023 was a year of program consolidation and partnership expansion for EVO. As related in other sections of this report, EVO volunteers worked hard on many fronts. Many IPMVP subcommittees continued developing various IPMVP application guides and made significant progress.

EVO also coordinated the review by the IPMVP Committee of the *Energy Saving Measurement and Verification (M&V) User Guide for the Kingdom of Saudi Arabia* to ensure the alignment with the IPMVP Core Concepts 2022.

EVO instructors also worked cooperatively over several months in amending the PMVA training program to align it with the IPMVP Core Concepts 2022 fully. They also developed and consolidated additional training material. The IPMVP was also translated into Italian, Spanish, and Brazilian Portuguese.

EVO strengthened its cooperation MOU with UNEP around the Global ESCO Network (GEN) co-management. Coordinated by EVO, the GEN issued its first newsletter in March, and we expanded our cooperation in the organization and promotion of GEN-sponsored webinars—a second GEN newsletter was also sent to over 18,000 recipients in October.

A new issue of M&V Focus was released in June, and a new edition of M&V Week was held in October, which was the case for the previous two years. As reported in another section of this report, EVO's executive director presented EVO's products and services at three events in November.

In addition, EVO's executive director, Denis Tanguay, was nominated to the board of directors of the new M&V association in France, APEMEVE.

COUNTRY-WIDE AGREEMENT WITH SENAI

EVO and Serviço Nacional de Aprendizagem Industrial (SENAI) agreed to deliver M&V training and certification in August. Under this agreement's terms, EVO accredits SENAI as an IPMVP® training and certification organization in Brazil.

EVO's M&V Fundamentals training complements SENAI's Energy Efficiency Specialist Certification, delivered under the SENAI Personnel Certification System – SSCP. The additional M&V training aligns with the IPMVP and EVO's PMVA.

The agreement reflects well on EVO's capacity to respond to the market needs of different partners in different countries. The message sent to other organizations around the world was and remains clear. By proactively adapting our products and certification delivery model, EVO is willing to cooperate with new and existing partners to pursue its vision and mission.

The agreement with SENAI is an excellent example of how EVO remains flexible, present, and relevant locally and globally. This flexibility is now possible thanks to significant changes adopted by EVO in early 2022.

IEEFP COMMITTEE

The year 2023 was very active for the IEEFP committee. The purpose of this committee is to discuss the role of M&V tailored to project sizes in energy efficiency project financing and to recommend actions, activities, and the development of new EVO products and services. This includes creating articles, position papers, webinars, white papers, and other policy and technical documents.

The committee work culminated in the publication of a white paper in December: *What Financial Institutions Need to Consider for Measuring and Monitoring the Decarbonization Impact of Energy Efficiency Loans.*

The white paper discusses using EVO's IPMVP and the IEEFP to measure the impact of energy efficiency loans on decarbonization. It provides financial institutions with an overview of the existing protocols to measure decarbonization in energy efficiency investments, the aspects they should consider when selecting a decarbonization protocol for their current and future portfolios, and, more generally, the relevance of properly tracking climate change impact in loan operations.

Members of the Global ESCO Network, ESCO Symposium, Paris, May 2024.

2024

After the many changes in our programs in the previous two years, 2024 was a year of consolidation and strategic expansion. We proceeded with the accreditation of new instructors and signed new training partnerships, including those with the Sustainable Energy Association of Singapore.

Additional partnership discussions were also initiated in Europe, Africa, and Asia to deliver M&V training, certification, and IEEFP training. Throughout the year, we also coordinated and facilitated in-house training in many countries where we did not have a training partner.

Many institutions also solicited EVO staff and committee members to review and comment on new energy efficiency programs and policies. We also provided input on decarbonization initiatives.

EVO and the Global ESCO Network organized the first International ESCO Symposium held in Paris in May. The event brought together ESCOs, ESCO associations, government representatives, financial institutions, and associated partners to inspire government actions for scaling up the contribution of ESCOs to the global response for mitigating the threat of climate change and the goals set out by the Paris Agreement.

In late 2024, EVO announced the creation of a new IPMVP Leadership Award. Daniel Magnet, a long-time EVO instructor and volunteer, was the first recipient of this award. Further details on this program can be found in the next section of this report.

INDUSTRY ALERT

In October, we had the unfortunate duty to issue an industry alert due to the repeated misuse of the IPMVP brand and trademarks. EVO was informed by many concerned individuals and organizations worldwide that some private companies and groups were using the IPMVP trademark to promote measurement and verification training and certification programs.

This unauthorized use of our valued trademark for purely commercial and mercantile activities can potentially mislead the industry, governments, and other institutions that rely on the IPMVP in their programs, regulations, and legislation. Misusing our brand, trademarks, and copyrighted material undermines our capacity to pursue our mission and erodes the valuable work of our volunteers.

The issuance of this industry alert had an immediate impact, and unauthorized references to the IPMVP were removed from many websites and related marketing materials.

TRAINING AGREEMENT WITH TEC DE MONTERREY

Program changes in early 2022 allowed EVO to regain its complete independence in deploying its program worldwide.

As another example of this successful transition to the establishment of flexible and fair partnerships, we announced in December the signature of an MOU to share IPMVP training material with Instituto Tecnológico y de Estudios Superiores de Monterrey (TEC).

EVO material will be incorporated in TEC's Elective E5040 Medición y verificación course, which is offered within the MER – Maestría en Administración de la Energía y sus Fuentes Renovables program.

This advanced course intends the student to know and apply concepts of measurement and verification of energy savings based on the IPMVP. At the end of this course, students will have the competencies to identify the elements of an M&V process based on the IPMVP and prepare an IPMVP adherent M&V Plan.

Students who take and pass the E5040 course will have the opportunity to write the IPMVP-PMVA certification exam. This bridges industry and academic efforts to provide students with the best tools to tackle the critical challenges of energy efficiency and renewable projects.

The first IPMVP course under this agreement starts on January 6, 2025.

M&V LEADERSHIP AWARD

EVO announced in November 2024 the creation of the EVO M&V Leadership Award. It will be remitted annually to an individual whose leadership and knowledge have improved the awareness and reach of IPMVP and its related training materials for professional certifications. The Award also recognizes the recipient's advocacy role in pursuing EVO's Vision and Mission. A call for nominations will be issued in early 2025 to recognize the next EVO M&V Leadership Award recipient.

The board of directors of EVO announced in November 2024 that Daniel Magnet is the inaugural recipient of EVO's M&V Leadership Award 2024. Daniel Magnet is known in Europe for his long-lasting leadership in promoting the broad adoption of the International Performance Measurement and Verification Protocol (IPMVP®) to measure and verify energy savings from implementing energy efficiency measures.

Daniel is a valued and respected ambassador for EVO. He has spearheaded the creation of significant measurement and verification (M&V) resources in France and other countries through authoring and contributing to many technical documents, books, notes, design of thematic courses, and tools that help implement M&V programs. His leadership has led to the greater adoption of the IPMVP in various programs for M&V activities, notably in Switzerland, France, and Belgium.

Daniel Magnet

Recipient of the 2024 M&V Leadership Award

Daniel received a scientific education in automation in the 1970s. He worked for about ten years at Pohlig-Heckel-Bleichert, where he implemented the first programmable systems in Maghreb to automate the storage, processing, and loading of ships to export phosphate.

After various involvement in large construction projects throughout the world, he took the leadership of the Marketing and R&D department of one of the worldwide leaders in Building Management Systems.

In the past 30 years, through his consulting firm, IBTECH, he worked on developing technical building systems in France and other countries. He has been a member of the strategic council of the European Intelligent Building Group.

Daniel started his involvement with EVO in 2004 as a member of the International Education and Training Committee and later became the committee chair for a decade. During his tenure, he implemented teaching, certification, and mentoring programs. He actively organized and delivered training and mentored EVO-accredited instructors worldwide.

In addition to his educational activities at EVO, Daniel delivered teaching modules in energy management, M&V, and energy performance for various universities in France, Luxembourg, and Switzerland.

He was an active participant in the French research project on energy performance guarantees (Garanties de Résultats Énergétiques – Fondation Bâtiment-Énergie) and was the co-author of a book entitled «Méthodes et Outils de la Garantie de Performance Energétique» (Energy Performance Guarantee Methods and Tools). He also participated in a European H2020 research project on net-zero emission buildings (NVEB).

Daniel is currently involved in many M&V initiatives in Europe, particularly in Belgium, France, and Switzerland, where he provides technical support on M&V, regulation development and implementation, and program evaluation. He is also an active instructor for EVO's PMVA and PMVE programs for AFNOR, the French National Standard Association.

Daniel continues contributing to EVO's mission through involvement with the Instructors Review Group, an EVO committee overseeing the accreditation of new IPMVP instructors worldwide. He is also an active member of the IPMVP sub-committee on Statistics and Uncertainty.

IPMVP COMMITTEE

As of December 31, 2024

IPMVP® INTERNATIONAL PERFORMANCE MEASUREMENT & VERIFICATION PROTOCOL

Chair
Tracy Philips
USA

Vice Chair
Margaret Selig
USA

Scott A. Judson
USA

Scott Noyes
New Zealand

Todd Amundson
USA

David Jump
USA

John Scourias
Canada

Jim Bradford
USA

David Korn
USA

Jessi Smith
USA

Luis Castanheira
Portugal

Ken Lau
Canada

Kevin Warren
USA

Phil Combs
USA

Christian Lemieux
Canada

Lia Webster
USA

Shankar Earni
USA

Eric Mazzi
Canada

Jim Zarske
USA

IPMVP Committee Activities

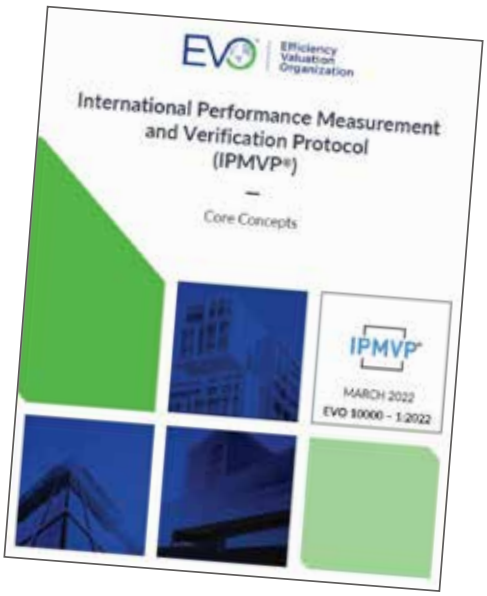
IPMVP History and Background

From the outset of the first publication of the IPMVP®, the objective of its originators was to develop a consensus approach to measuring and verifying efficiency investments to facilitate a scaled-up global engagement into energy efficiency.

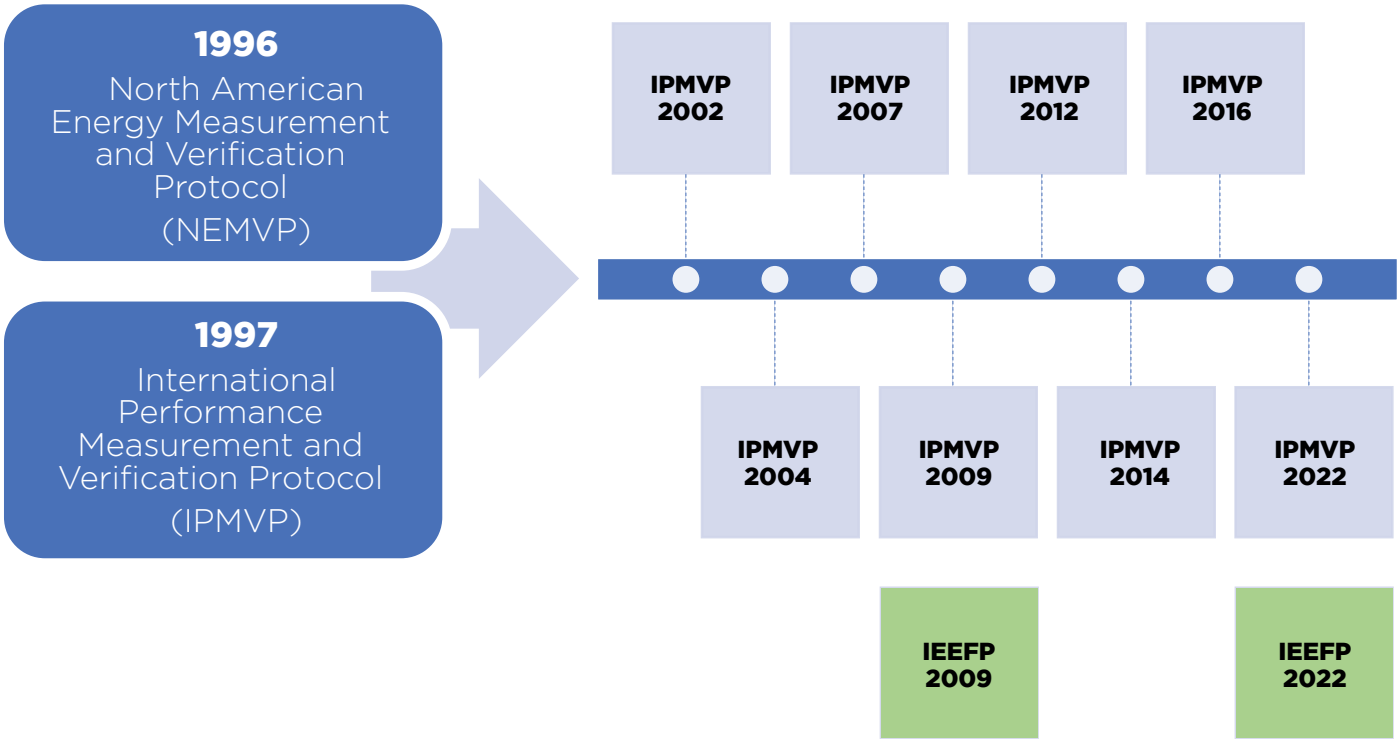
The IPMVP aims to reduce barriers to the energy and water efficiency industries. Adopted broadly by energy services companies initially, the IPMVP is now used by utilities and government agencies for their demand-side management incentive programs and by building, manufacturing, and industrial managers to assess and improve their facilities' performances. Increasingly, financial institutions understand the advantages of using the IPMVP as a risk reduction framework for their investments.

In the context of the global energy transition to a low-carbon economy, the IPMVP also offers a consistent approach to measuring and verifying carbon emissions reduction in a broad range of energy sectors, including different types of facilities, industrial applications, and renewable energy.

As primarily a non-prescriptive framework, the IPMVP provides an overview of M&V's current best practices while remaining flexible. It is also a living document whose methodologies and procedures enable the Protocol to evolve and reflect current and new market needs.



IPMVP AND IEEFP UPDATES SINCE 1997



IPMVP Development Work – Application Guides

NON-ROUTINE EVENTS AND ADJUSTMENTS

BACKGROUND

- Thanks to the financial support of the **Bonneville Power Administration, Seattle City Light** and **EVO** self-generated revenues, this document was published in 2020. It has been downloaded nearly 3200 times from our website.
- The publication followed the release of a white paper on advanced M&V in 2019. EVO convened dozens of industry experts from across the US and other countries and is the result of a broad industry consultation and consensus.
- This publication was timely as it was used by many utilities to assess the impact of COVID-19 on their energy efficiency projects and programs.

CONTENT

This document is an Application Guide that supports the IPMVP. While the IPMVP Core Concepts provides an overview of non-routine adjustments relative to measurement and verification projects, this Application Guide serves as an expansion on the topic. The guide provides a series of approaches to detect and identify non-routine events and multiple methods to make non-routine adjustments.

M&V AND PERFORMANCE CONTRACTING FOR FACILITY OWNERS

BACKGROUND

- The initial development of the IPMVP in the 1990s was largely motivated by the need to develop a consensus approach to measuring and verifying efficiency investments in order to overcome existing barriers to efficiency.
- The first versions of the IPMVP were very focused on ESCOs. Over time, the M&V concepts of the IPMVP were broaden to apply to various types of projects.
- This application guide focusses exclusively on performance contracting and M&V guidance specific to the context of ESCOs.

CONTENT

This application guide is intended to provide additional information to the facility owner or industrial facility manager that would like to implement an energy performance contract involving guaranteed savings by an energy services company. Several issues may arise during the normal process of negotiating and implementing an EPC. A solid M&V process is a key factor to limit some of those issues. The most important of these have been selected and are addressed in this application guide. This application guide is written with the idea to be adapted to several EPC contexts.

EVALUATION, MEASUREMENT AND VERIFICATION

BACKGROUND

- Program evaluations are made subsequent to, or concurrent with, program-level M&V efforts.
- Utility and Governmental programs have specific EM&V guidelines, which often claim adherence with IPMVP. However, in many cases, full adherence with IPMVP is not possible.
- Where energy savings are not based on IPMVP adherent M&V procedures applied at each individual project, the results can be unreliable.
- Even where the procedures used in a program evaluation are not fully adherent with IPMVP, EM&V efforts generally follow the IPMVP principles, such as making conservative savings estimates.

CONTENT

The purpose of this document is to provide guidance on utilizing the IPMVP for energy efficiency program gross impact evaluation by addressing the challenges specific to this task. Many EE program evaluation guidance documents refer to the IPMVP as a preferred option for determining measure-level or project-level savings. This is appropriate, since the IPMVP is inherently flexible, and is the global standard for measurement and verification. Many evaluation guidance documents cite the IPMVP, but such citations are at a high level. Despite these high-level citations, the level of adherence to the IPMVP is not well established and the letter and spirit of the IPMVP is often not followed. This document thus seeks to bridge the gap between program evaluation guidance documents and the IPMVP. This document provides specific guidance for independent EE program evaluators seeking to produce verified EE program energy and demand impacts for regulatory compliance, capacity market savings validation, or for other purposes requiring an equivalent level of rigor. It is particularly relevant when the jurisdiction requires IPMVP-adherent M&V.

UNCERTAINTY ASSESSMENT

BACKGROUND

- The practice of energy savings Measurement and Verification involves the collection and analysis of measured data, and the assessment of the quality of the resulting savings estimation.
- Multiple methods are used to determine savings, each with different strengths and drawbacks.
- Balancing comprehensiveness, cost, and confidence in savings estimates to arrive at the most appropriate M&V methodology is part of the role of the M&V Practitioner.
- This Application Guide is developed to provide M&V Practitioners with methods and tools that enable them to assure savings are determined with the appropriate rigor and confidence expected by the involved parties.

CONTENT

This guide discusses sources of error and uncertainty in the measurement and estimation of savings. It presents statistical and probabilistic methods that may be used in the M&V process. These methods may be used to reduce M&V costs, draw inferences from measured data, and enable estimation of savings uncertainty. It is intended to expand the M&V practitioner's understanding and toolkit for addressing M&V issues, drawing on both established and emerging practices.

ADVANCED M&V

BACKGROUND

- Technical developments in modeling methods and software tools are improving the accuracy of energy models.
- Technical guidance, pilot program case studies, and regulatory language examples can provide direction to those looking to incorporate advanced M&V into their portfolio of projects or programs.
- It remains critical, however, to ensure that tools and methods are applied using a rigorous process, and not to simply trust that a 'good' M&V tool is guaranteed to give an accurate result. For large-scale deployments, comparative tool testing is recommended to select the most technically accurate solution for a given population.
- Although not required for IPMVP adherence, several open-source AM&V tools are now available, with several focused on commercial applications. Although site level verification requirements may be reduced, they are not eliminated and can be more critical than when using other M&V approaches (e.g., retrofit isolation).
- Practitioners evaluating savings with advanced M&V require project-level details, which is an essential resource to evaluate non-routine events.

CONTENT

The evolving market and industry context that includes EE, DR, and DG will require M&V approaches to continue to evolve and foreshadows the need for 'integrated M&V' to delineate savings at the most advanced project sites. These ongoing changes keep IPMVP relevant and underscore the need for a unified vocabulary to discuss increasingly complex measurement and verification applications. This guide on advanced M&V will provide necessary guidance on navigating the nuances when executing advanced meter-based M&V methods.

M&V FOR RENEWABLES, ON-SITE GENERATION, AND STORAGE

BACKGROUND

- On-site renewable energy, energy generation, and energy storage systems are commonly found at facilities conducting the M&V process. Energy from these systems will need to be accounted for if they impact the energy consumption, generation, or costs within the measurement boundary.
- Often, on-site sources are used to offset whole building energy and demand provided by a utility and, in some cases, provide excess energy to the utility. Energy and demand from these types of systems should typically be measured continuously.
- In some cases, an on-site energy generation or storage system may be installed as an EEM. In these cases, direct measurement of the net energy and demand provided by the on-site system may be needed.
- Care is required in applying the IPMVP savings equations in these instances, especially where energy flows may reverse.
- When determining avoided energy consumption, the actual consumption and/or demand provided by generation and storage systems during the reporting period, the measured values can be used directly and may need to be aligned with the utility.
- In some cases, utilities have demand response or other programs where demand reductions are requested from customers with little notice and may use automated controls to achieve short-term site-level demand reductions.

CONTENT

This document describes special M&V considerations regarding renewable energy systems. Its scope includes M&V options for renewable energy systems within the IPMVP framework as well as examples and recommendations for specific applications. Technologies considered for inclusion in this revised guide include solar PV, solar hot water, solar concentrators, wind, biomass (e.g., sustainably harvested food crops, organic wastes, and landfill gas), geothermal, small hydroelectric, ocean thermal, wave and tidal energy, CHP (e.g., in conjunction with RNG), microgrids, heat, etc.

M&V FOR WATER

BACKGROUND

- Water is required to sustain life around the planet. As the population continues to grow so does its need for domestic use, agriculture, recreational and industrial processes.
- At the same time, climate change is increasing the uncertainty of when water is available making utilities and water managers regularly reevaluate their storage, distribution systems, and how their customers use water.
- As a result, the cost of water continues to rise, focus on conservation is increasing, and the general population's culture around how they use water is shifting.
- Accounting for water conservation efforts at the facility and utility program levels requires developing a protocol for measuring water use and performance of efficiency upgrades.
- Historically, the M&V concepts of the IPMVP were always inclusive of energy and water applications. For simplicity purposes, the wording in the various versions of the IPMVP gradually eliminated the terms "water" and the applicability of the IPMVP became less known over time.

CONTENT

This IPMVP application guide presents M&V options for water using systems within the IPMVP framework and includes examples and recommendations for specific applications including domestic, commercial, industrial, recreational, agricultural, and power generation.

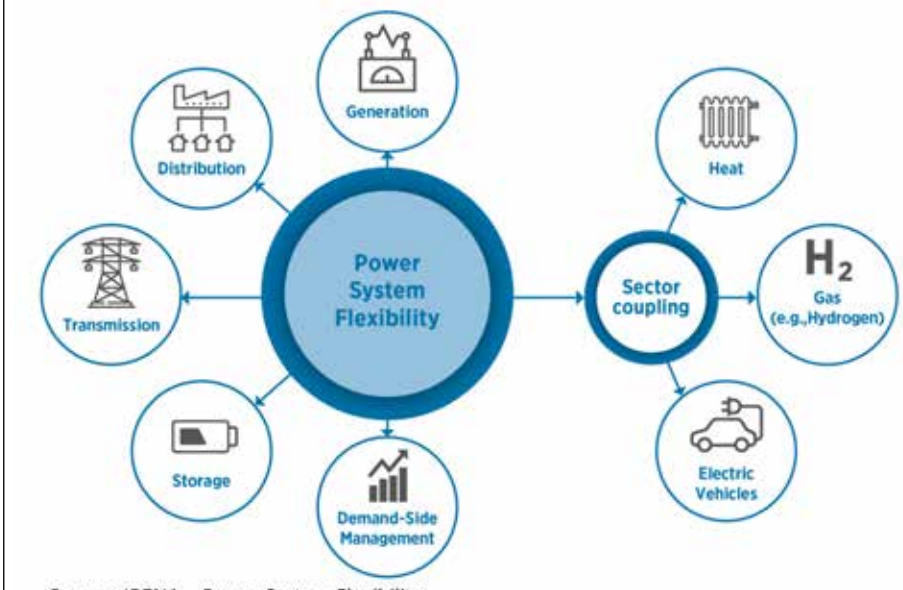
DEMAND RESPONSE / FLEXIBILITY

BACKGROUND

- As demand response and energy flexibility strategies emerge, solutions are designed to fit the needs of different energy market structures. Further market developments will include the participation of an increasing number of interested parties involving a growing number of technologies. Proper market allocation of the energy benefits resulting from these strategies will require adequate measurement and verification methods.
- A key differentiating factor is the shorter timescales for baselines compared to energy performance contracting – one month is considered long, whereas usually, it is five days. Many DNOs also have different timescales for baselines, e.g., UK Power Networks is five days, other markets are ten days. Most are either type 1 'meter before meter after' or type 2 – an adjusted or nomination baseline. This is relatively crude, with some adjustments to 'days in which the flexibility was called' or 'weekends/weekdays' or 'time of day use.'
- Weather is not considered nor occupancy. A critical factor concerning DNOs and grid operators seems to be the gaming effect of increasing a baseline before a known event. A possible issue is the rebound effect post-event, in which more energy is consumed to compensate for building back to normal working conditions.

CONTENT

Several documents will be produced during the application guide development process, including a literature review and some case studies. The objective is to adapt the existing IPMVP to provide baselines and settlement support for electricity supply and distribution operators. One of the outputs would be standardizing the terminology, such as kW Flex, run rate, and recovery time. Rebound effect would need to be considered, as well as non-routine adjustments. Development of the type of baseline and its accuracy is of crucial importance.



Source: IRENA – Power System Flexibility

M&V AND IPMVP OPTION D

BACKGROUND

- In 2019, EVO developed a full three-day course on Option D. This was in response to industry demand for more guidance on addressing M&V issues in new buildings. After the first delivery of the course, industry participants thought that an IPMVP application guide would help further codify the M&V guidance on the use of Option D and physical models.
- The only current obligation by the IPMVP for using a physical model is at the operation stage of the building to obtain a calibrated model. By calibrated, it means that the physical model reproduces the real measured behavior of the building.
- However, in a building project, the physical model is commonly used in building design to help optimize performance and also help evaluate an in-use energy target.
- In this case, it can be interesting to pool modeling efforts and update the model from the design stage to use this base to obtain the physical model "as built and operated" for the calibration step.

CONTENT

M&V is the process of using measurements to determine reliably the savings created within an individual facility by applying energy efficiency measures. Savings are determined by comparing measured consumption and demand before and after the implementation of a project, making appropriate adjustments for changes in conditions. Different adjustment models, such as statistical, hybrid, or physical, can be used. This document aims to give guidelines on using physical and hybrid adjustment models.

TRAINING COMMITTEES AND ACTIVITIES

M&V Fundamentals Committee

This group looks after EVO's flagship training program, the M&V Fundamentals and IPMVP for Energy Managers, the IPMVP training program leading to the PMVA certification. The committee ensures that the training materials align with the latest versions of the IPMVP Core Concepts and published IPMVP Applications Guides. Members also recommend potential EVO Training Partners.

COMMITTEE MEMBERS

Daniele Forni
Italy

Gary Chu
Macao

Marco Correia
Portugal

Mark Stetz
United States

Vanessa Tirado
Mexico

Todd Amundson
United States

The Advanced and Thematic Training Committee

This committee is composed of experts that are developing and updating advanced and thematic courses training materials. This group discusses current M&V issues from a worldwide perspective and identifies topics of interest for the future development of technical guidelines and educational material. Members manage advanced and thematic instructors' mentoring and accreditation and identifies improvements to training material. Members recommend potential EVO Training Partners.

COMMITTEE MEMBERS

Lia Webster
United States

Hassan Ali Younes
Saudi Arabia

Rajvant Nijjhar
United Kingdom

Sandeep Dahiya
India

Paul-Calberg-Ellen
France

The Instructors' Review Group

This committee develops and maintains the criteria and mechanisms for the mentoring of new EVO approved instructors.

COMMITTEE MEMBERS

Mark Stetz
United States

Bruce Rowse
Australia

Daniel Magnet
Switzerland

Rajvant Nijjhar
United Kingdom

At the end of 2024, EVO's training activities were structured into four main groups.

Development of a New Advanced Training Program on Option D

In 2021, EVO sponsored the development of an Option D advanced training program that was first delivered at the end of 2021 in France and again in 2022. The training

IPMVP Option D is mostly applied in Europe, particularly France and Belgium. The course was developed in the French language and deployed under two formats:

1. Three-day for technical experts and
2. One day for project owners.

The target audience of the one-day workshop is mostly facility owners and managers. The objective is that trainees understand the steps of Options to develop project specifications and check the proposals received for conformity. It provides some background on polynomial models, how these are built, and how simulations are conducted.

The advanced three-day course is for engineers who already understand the steps of Option D. The course will guide them to develop a relevant Option D M&V Plan to manipulate simulation tools correctly to assess the savings under this IPMVP Option. The course covers advanced topics such as sensitivity analysis, uncertainty analysis, and polynomial models built on simulations.

The M&V Fundamentals and IPMVP course is a prerequisite for the one-day workshop and the three-day advanced IPMVP Option D course.

IEEFP® INTERNATIONAL ENERGY EFFICIENCY FINANCING PROTOCOL

IEEFP Training Program Expands to Mexico

After successfully piloting IEEFP training in Canada in 2020, EVO partnered with AMENEER in Mexico to develop an IEEFP country annex for Mexico and deploy IEEFP training there. This initiative aimed to get additional comments to consolidate the IEEFP training material and provide guidance on further training needs. Training participants received the support of the NAMA Facility, a joint program of the governments of Germany, the United Kingdom, and Denmark.

In 2021, EVO staff initiated work to expand the content of the IEEFP training as a response to the events held in Canada and Mexico. This initiative seeks to deliver additional elements and tools for massive replication of the IEEFP in Mexico and globally.

The project seeks to expand the IEEFP document and training materials to strengthen the training program in the national Mexican context for energy efficiency financing activities within the frame of a neutral protocol.

EVO also wishes to provide the local financial institution with a more fundamental perspective on developing energy efficiency financing to create new lines of business that are very profitable for all types of projects and financial scales.

The project aims to develop an introductory online course on the most common energy efficiency technologies. This section is an important component of the IEEFP. The course was designed in the Fall of 2022. Trainees are expected to complete a self-taught online training module before taking the entire IEEFP training program.

Past trainees also recommended adding more risk analysis material to the current IEEFP training material. Developing a hands-on IEEFP course on cash flow analysis was also suggested. This work was well in progress at the end of 2022 and shall continue throughout 2023. An IEEFP certification test is also in progress.

The IEEFP Committee

The goal of this Committee is promoting the importance of M&V when financing energy efficiency projects. The IEEFP Committee looks after all aspects related to the International Energy Efficiency Financing Protocol, including maintaining the protocol current, developing and approving IEEFP training materials and programs. The group also builds bridges between the M&V and the financial and banking communities by publishing papers and holding consultations and discussion groups.

COMMITTEE MEMBERS

Livia Miethke Morais
Switzerland

Rodrigo Chaparro
Mexico

Ryan Beard
United States

Alberto Escofet
Mexico

Jalel Chabchoub
Morocco

Marco Schiewe
Brazil

Ivan Gerginov
Canada

M&V CERTIFICATION

In 2019, EVO conducted a global survey to seek industry input to guide EVO's future M&V product development activities. One strong message coming out of this survey was for EVO to continually enhance the knowledge, skills, and abilities of M&V professionals.

This message was in line with the views of our international team of M&V instructors that the *M&V Fundamentals and IPMVP* training program in place until then was not sufficient and that an advanced course and certification on M&V Planning was necessary.

To reflect on the survey's outcome, EVO created in 2022 two new certification programs for M&V professionals.

PMVA™
PERFORMANCE MEASUREMENT AND VERIFICATION ANALYST

The ***Performance Measurement and Verification Analyst (PMVA)*** certification establishes the IPMVP standard for individuals applying performance, measurement, and verification concepts to energy efficiency projects. This is the official IPMVP training and certification program for M&V fundamentals. PMVAs typically work in an analyst role for ESCOs, public administration, utilities, and financial institutions and are involved in designing and implementing energy efficiency programs and financing energy efficiency projects. They have demonstrated M&V capabilities, including a good understanding of applying the IPMVP to determine savings. PMVAs could be building technologists, HVAC specialists, engineers, architects, economists, financial analysts, etc.

PMVE™
PERFORMANCE MEASUREMENT AND VERIFICATION EXPERT

The ***Performance Measurement and Verification Expert (PMVE)*** professional certification establishes the IPMVP standard for individuals engaged in preparing or analyzing measurement and verification plans. PMVEs typically work as M&V specialists and design, elaborate, and implement M&V plans for comprehensive and complex energy efficiency projects. PMVEs also work as consultants and project facilitators for facility managers and building owners. PMVEs work as senior M&V analysts for public administration, utilities, and financial institutions. PMVEs typically have advanced applied expertise in various aspects of M&V and are capable of preparing/challenging M&V plans and reports. Most PMVEs will hold a technical degree and have a solid understanding of various energy efficiency measures.

EVO's PMVA and PMVE certifications are earned exclusively by demonstrated field M&V work achieved through M&V relevant education, professional expertise, and experiences.

COMMUNICATION ACTIVITIES

The listing below is an incomplete recollection of various communication activities conducted by EVO staff, board members, and other EVO stakeholders, such as committee members and instructors.

In addition, we participated in podcasts, radio interviews, and other activities for printed media. EVO also consulted with various governments worldwide on several occasions and conducted individual briefings and information webinars on M&V and the IPMVP for many private companies and organizations.

We also consulted with international bodies and provided expertise on M&V for developing programs and regulations, localized M&V protocols, and other technical documents.

Our staff also sat on advisory boards for institutionally funded projects and recommended experts for in-depth initiatives on M&V for energy efficiency and green financing funds.

ANESE – 1er Congreso – Descarbonización y sostenibilidad, Madrid (Spain), November 21, 2023. Panelists: Denis Tanguay (EVO), Dinis Rodrigues (EBRD), Søren Lütken (Global ESCO Network), Livia Miethke Morais (BASE), Verónica Sanz (Journalist-La Sexta)

PUBLISHED ARTICLES AND REPORTS

> ***"How trustable are energy savings."***
Energy Efficiency Magazine for COP 26, AOB Group, October 31, 2021

> ***"Helping banks measure the carbon savings of energy efficiency projects."***
Environmental Finance, January 25, 2024

> ***"Measurement and verification of energy efficiency projects: project performance, emissions, financing, and other key considerations"***
(Special report prepared for FIRE), December 5, 2023.

PRESENTATIONS – CONFERENCES AND WORKSHOPS

> **Tema de EVO:** ***"Importancia de la M&V."***

Tema del panel: Importancia de la medición y verificación en proyectos de eficiencia energética en la industria.

CONUEE, Mexico, March 3, 2021

> ***"The M&V of Savings in ESPCs Challenge"***

The ESCO Business Summit

The 3rd Indonesia Energy Efficiency and Conservation Conference & Exhibition

Indonesia, June 14-17, 2021.

> ***"Building Trust in Energy Savings Through Capacity Building"***

ZeroBuild Türkiye'21 – International Zero Buildings Forum

Turkey, September 23, 2021

> ***"Updates on IPMVP and Application Guides"***

Key Energy, Rimini (Italy), October 28, 2021

> **Panel participation:** ***"The Measurement and Verification Procedures of Performance".***

STEPPING PLUS – Training event 3, AESS – Agenzia Energia e Sviluppo Sostenibile

Italy (online), December 16, 2021.

> ***"The evolution of M&V and the IPMVP"***

Key Energy, Rimini (Italy), November 10, 2022

> ***"IPMVP and its applications"***

Key Energy, Rimini (Italy), March 23, 2023

> **Panel participation –** ***"The Rise of Prosumers"***
> **EVO theme:** ***"Valuing energy savings through the use of protocols"***

Decentralized Energy Canada, Lake Louise (Alberta-Canada), November 6, 2023

> **Panel participation – EVO theme:** ***"Transforming intangible assets and environmental attributes into valuable and tradable assets"***

ANESE – 1er Congreso – Descarbonización y sostenibilidad, Madrid (Spain), November 21, 2023

> ***« La M&V: un outil indispensable pour la transition énergétique »***

Colloque AFNOR Énergie 2023, Paris La Défense (France), November 23, 2023

> ***"IPMVP development activities – an update"***

Key Energy, Rimini (Italy), February 28, 2024

> ***"Building Bridges: Fitting EE into the Banks' Quest for Net Zero"***

IEECB&SC'24 and ESCO Conference, Frankfurt, March 7, 2024

> ***"Measurement and Verification in Performance Contracts"***

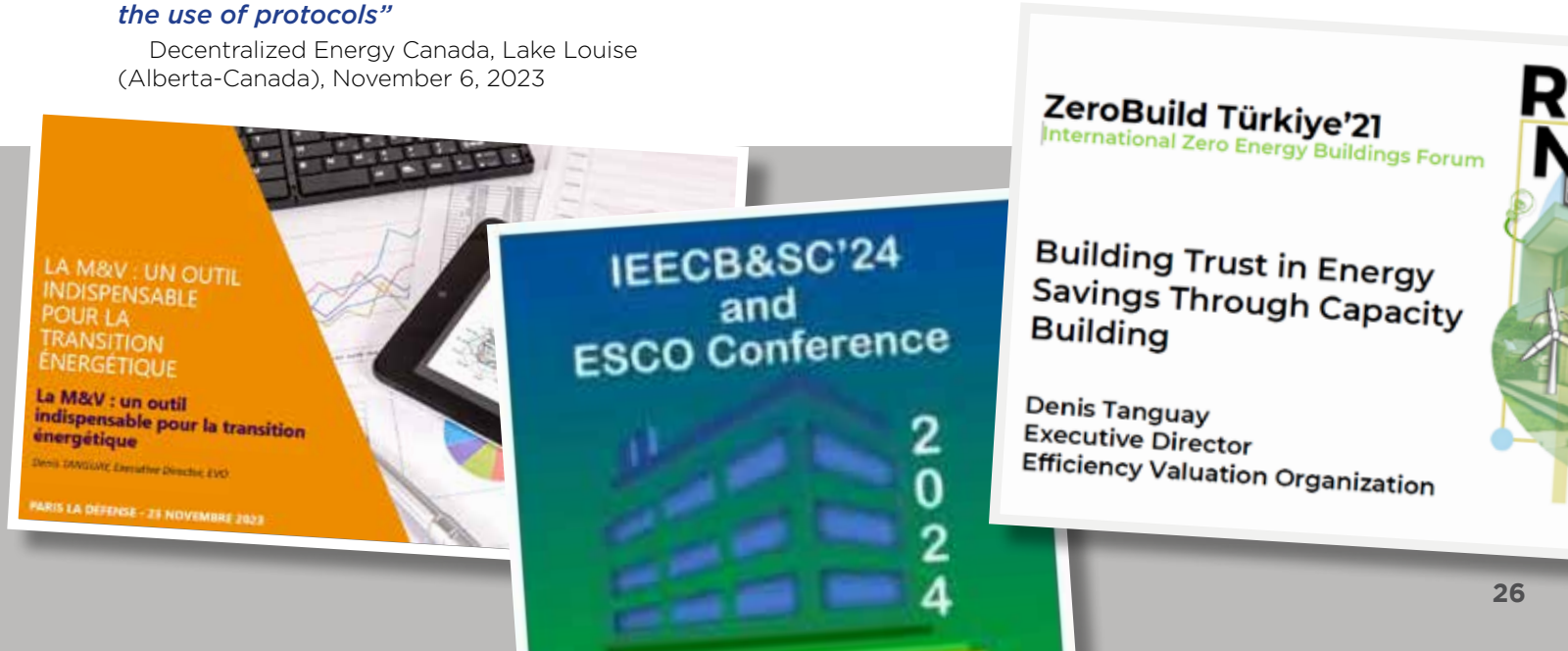
Global ESCO Network Symposium, Paris (France), May 29, 2024

> ***"Measurement and Verification for Projects and Programs – Recent and Upcoming IPMVP Documents"***

FIRE – M&V Conference, Bologna (Italy), October 22, 2024.

> ***« Actualité internationale IPMVP – Nouvelles initiatives EVO et état d'avancement des guides d'applications »***

Colloque AFNOR Énergies – Mesure et Vérification de la Performance Énergétique, Paris (France), November 7, 2024.



WEBINARS

> ***"M&V: una herramienta de mitigación de riesgos para proyectos de eficiencia energética"***
CONUEE – Semana de Eficiencia Energética en la Industria, México, March 3, 2021

> **Panel participation – EVO theme: *"M&V, el IPMVP y EVO en México"***
CONUEE y AMENEER, México, March 26, 2021

> ***"Measurement and Verification in Energy Performance Contracts"***
Global ESCO Network (Online), October 25, 2021

> ***"Release of the IPMVP Core Concepts 2022 – Highlights"***
Global ESCO Network, March 22, 2022

> ***"Measurement and verification protocols: IPMVP and beyond."***
FIRE (Italy), March 15, 2023

> ***"Programas de EVO y el IPMVP"***
EVO-CONUEE-AMENEER, México, April 21, 2023

> ***"The International Energy Efficiency Financing Protocol (IEEFP)"***
Global ESCO Network, April 25, 2023

> ***"Protocolo internacional de financiamiento de eficiencia energética (IEEFP)"***
Presentación para NAFIN, México, May 4, 2023

M&V MASTER CLASSES

(Recordings of all master classes are available in the subscribers' section on the EVO website)

- ***"Backcasting"***
  Daniel Magnet – January 22, 2021
- ***"RETSCreen Day 1 – Intro to RETScreen Expert as a Measurement & Verification Tool"***
  Stephen Dixon – April 13, 2021
- ***"RETSCreen Day 2 – Basic Option C M&V"***
  Stephen Dixon – April 14, 2021
- ***"RETSCreen Day 3 – Advanced Option C M&V"***
  Stephen Dixon – April 15, 2021
- ***"RETScreen Day 4 – Analysis of Interactive Effects with RETScreen Expert"***
  Stephen Dixon – April 16, 2021
- ***"Performance Contracting, the Belgian Approach"***
  Lieven Colardyn – September 13, 2021
- ***"Application of M&V in Cement Industry"***
  Ayoub Baba – October 6, 2021
- ***"Open Studio: A Powerful Open-Source Toolkit for IPMVP Option D"***
  Marc Costa, Chris Balbach, Craig Simmons – October 25, 2021
- ***"Criticality of Reliable EE Savings Estimates and M&V to IRR"***
  Tom Dreessen – October 28, 2021
- ***"L.I.N.E with Stat Plus"***
  Daniel Magnet – October 28, 2021
- ***"Using energy Modeling for Adjustments in Option C"***
  Hassan Younes – December 12, 2021
- ***"Machine Learning for M&V"***
  Brad Schultz, Hao Huang, and Asanka Rahubadda – May 6, 2022
- ***"Over What Range Can a Regression Model be Used When Determining Savings?"***
  Bruce Rowse and Daniel Magnet – October 27, 2022
- ***"How to ISO Your Way to Successful M&V?"***
  Rajvant Nijjhar & Ian Byrne – October 27, 2022
- ***"Decarbonization Through Energy Efficiency Towards the Achievement of Net-Zero Targets"***
  Livia Miethke Morais – October 28, 2022
- ***"Why Simplification of Energy-Related Emission Measurement May Lead to Poor EE Investments"***
  Bruce Rowse – March 30, 2023
- ***"The use of the IPMVP for the PLAGE program in Brussels"***
  Sven Wuyts – April 20, 2023
- ***"M&V for Unitary Air Conditioning"***
  Sandeep Dahiya – July 7, 2023
- ***"Adding the Calibration of Building Energy Models in the Toolkit of M&V Methods"***
  Sotiris Papadelis – October 25, 2023
- ***"Uncertainty Assessment Guide – PMVA Essentials"***
  Simon Rouchier and Daniel Magnet – October 27, 2023
- ***"Operational Verification"***
  David Kobayashi – February 28, 2024
- ***"Beyond Energy Efficiency, Applying M&V Techniques to Decarbonize Facilities"***
  Nataka White – March 8, 2024
- ***"International Energy Efficiency Financing Protocol"***
  Livia Miethke Morais – April 29, 2024

M&V FOCUS

MEASUREMENT AND VERIFICATION ONLINE MAGAZINE

M&V Focus was successfully launched in 2018. With an extensive outreach to stakeholders interested in different aspects of M&V, we consider various articles for publication in M&V Focus, including case studies, research results, academic and education-oriented, feature, opinion, interviews, and debates.

In 2021, 2022 and 2023, we published four issues with content from Chile, Canada, the United States, the United Kingdom, France, and Italy. No issue of M&V Focus was published in 2024.

M&V Focus key facts

257,832 hits (reads)
as of December 31, 2024

46 articles published in 11 issues

Articles published in English, Portuguese, Spanish, French, and Italian

Issue 8 — March 2021

Certificación de Ahorros de Proyectos Energéticos (CAPE): Un mecanismo nacional basado en el IPMVP para certificar los ahorros de proyectos energéticos

Por Krystian Muñoz y Álvaro Soto

Impacts of COVID-19 on Measurement and Verification (M&V) of Energy Savings: Market Perspectives

By Lia Webster, with support from EVO's Focus Group on COVID-19

Impacts of Covid-19 on Measurement and Verification (M&V) of Energy Savings: Considerations for Projects & Programs

By Lia Webster, with support from EVO's Focus Group on COVID-19

Energy@Work's Commercial Office Experience Using EVO's Non-Routine Adjustment (NRA) Method #6 to Quantify Electricity Savings During a Pandemic

By Amir Kamandlooie, Scott Rouse, and Edward Newton

Issue 9 — Nov 2021

Using EVO's Non-Routine Adjustment (NRA) Methods to Quantify Electricity Savings during the 2020 pandemic

By Amir Kamandlooie, Scott Rouse, and Lucas Oliveira

Heat Meters Using Ultrasonic Flow Measurement

By Vilnis Verma

Measurement & Verification: At the Core of Energy Performance Contracting

By Pierre Langlois and Denis Tanguay

Energy Savings from New HVAC with Variable Flow and Capacity, and Higher SEER, at a home near Boise, Idaho, USA

By Bill Koran

Not All Savings are Created Equal

By Denis Tanguay

Issue 10 — Oct 2022

Relaxing CV (RMSE) Requirements for Option C M&V Regressions

By John Avina

De nouvelles perspectives suite au projet MPEB

By Paul Calberg

Impacts of Covid-19 on Measurement and Verification (M&V) of Energy Savings: Considerations for Projects & Programs

By Lia Webster, with support from EVO's Focus Group on COVID-19

The Energy Accounting Method Developed by the Italian Associatin of Certified Energy Managers and the Italian Federation for the Rational Use of Energy

By Dolf van Hatterm

Issue 11 — June 2023

Keep Science in the Practice of M&V

By Eric Mazzi

The International Energy Efficiency Financing Protocol (IEEFP)

By Denis Tanguay

New Perspectives Following the MPEB Project

By Paul Calberg-Ellen

Tribute to Agenor Gomes Pinto Garcia

Presentation by Denis Tanguay and content by Agenor's family

M&V WEEK

EVO LAUNCHES THE MEASUREMENT & VERIFICATION WEEK

On June 30, 2021, EVO announced the creation of M&V Week, an annual event set to take place annually in October.

EVO hosts the World M&V Week and showcases activities organized in individual countries to promote M&V.

The events and activities highlight the importance of project-level M&V as prescribed by the IPMVP. It is an awareness gathering place for policymakers, investors, building owners, utilities, and energy efficiency program designers.

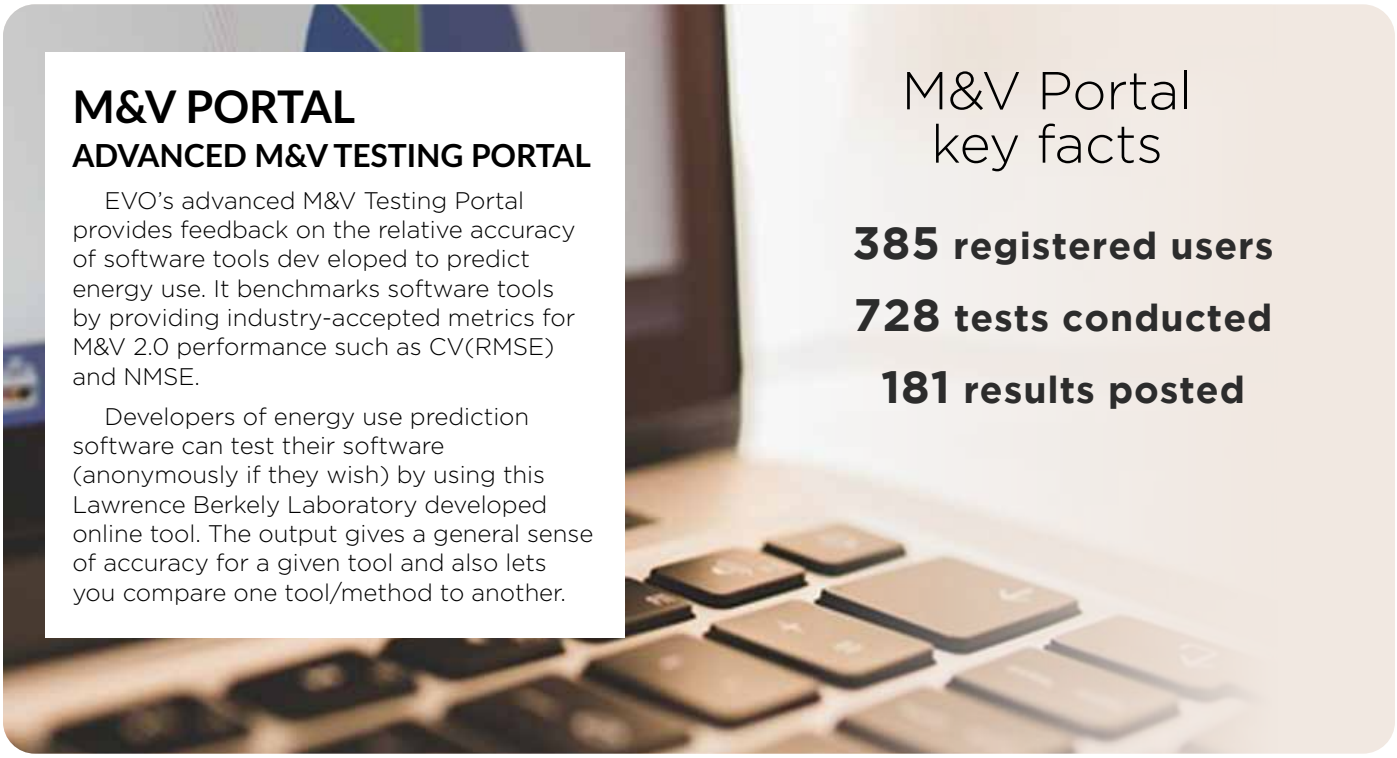
M&V Week key facts

First editions in 2021, 2022, 2023, and 2024

Over 2700 registrations

20+ events partners

+50 different events and activities



M&V PORTAL

ADVANCED M&V TESTING PORTAL

EVO's advanced M&V Testing Portal provides feedback on the relative accuracy of software tools dev eloped to predict energy use. It benchmarks software tools by providing industry-accepted metrics for M&V 2.0 performance such as CV(RMSE) and NMSE.

Developers of energy use prediction software can test their software (anonymously if they wish) by using this Lawrence Berkely Laboratory developed online tool. The output gives a general sense of accuracy for a given tool and also lets you compare one tool/method to another.

M&V Portal key facts

385 registered users

728 tests conducted

181 results posted

M&V BLOG

LAUNCH OF THE EVO M&V BLOG

In April 2021, EVO announced that a new blog dedicated to M&V of energy savings was officially put online. All EVO partners, instructors, committee members, and EVO web subscribers are invited to guest blog on this forum.

The purpose is to provide a public space to discuss the role of M&V from different perspectives but with a strong bias toward policy and financial topics.

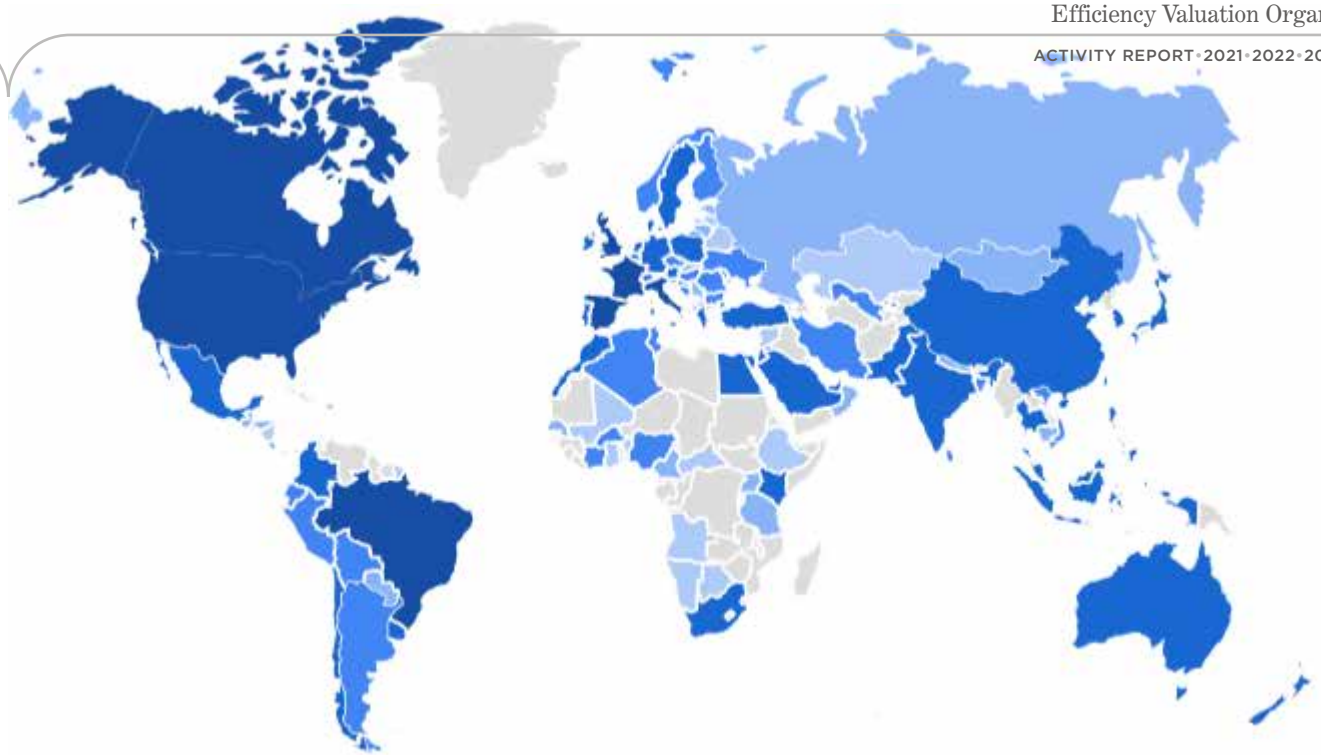
The EVO Blog is another opportunity to debate and challenge existing concepts and discuss new ideas concerning M&V. We want this blog to be engaging and informative. The EVO Blog complements our popular online magazine, M&V Focus, which presents technical articles and extended case studies.

M&V Blog key facts

2 173 subscribers

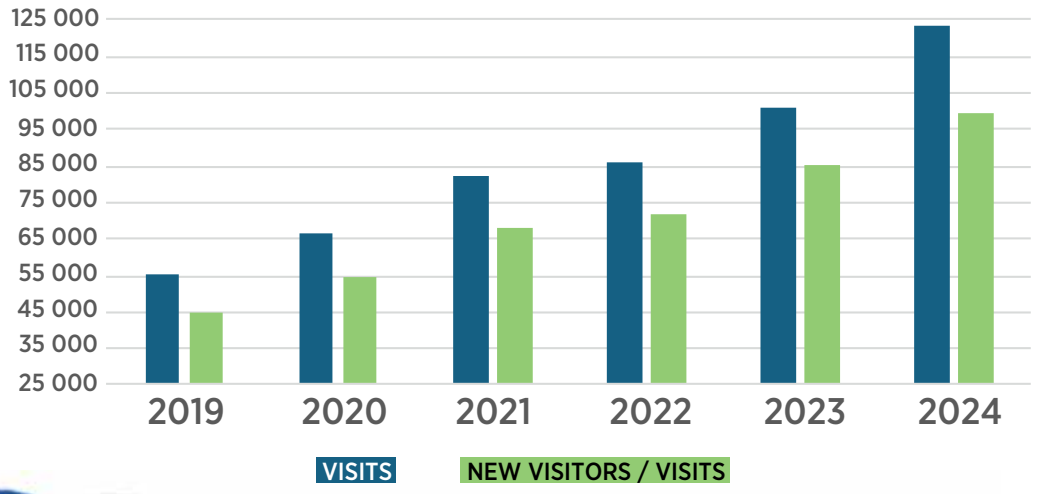
26 111 hits (reads)

Great results for only five posts!

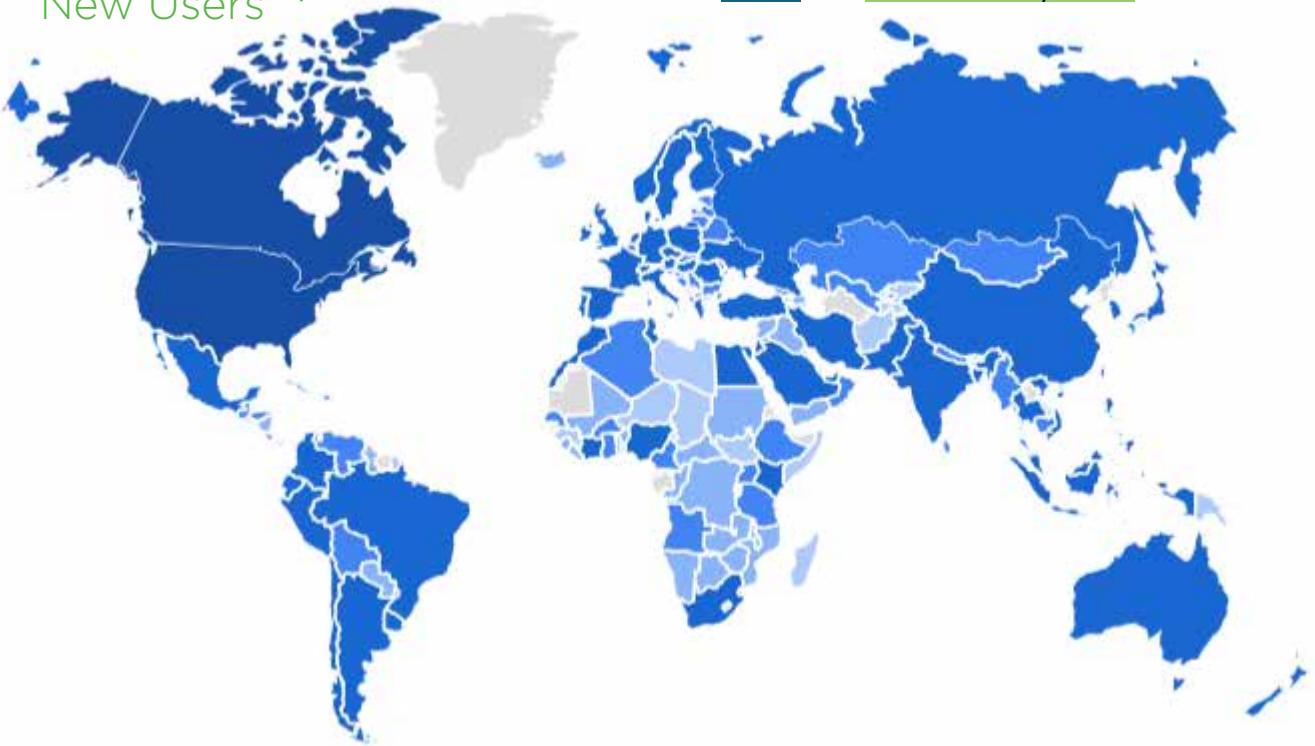


Known Users

EVO Website Traffic



New Users



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EVO
Efficiency
Valuation
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