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TESTINGLY

Testing, Inspection & Certification Magazine

2022 CIGRE, green to market strategy: what's next?

magazine by KEMA Labs

KEMA Labs

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> KEMA will also share a couple of windows on the world of laboratory tests that introduce what has recently been requested by the world of automation and digital measurement

Domenico Villani
CESI Group CEO

The restart of CIGRE with the presence of KEMA Labs

Since the birth of Testingly, this is the first time that the cover editorial will not be signed by the former CEO Matteo Codazzi. Indeed, after more than 13 years, Matteo Codazzi has decided to leave CESI for new professional developments. In his place, the shareholders have chosen, after many years and for the first time, an internal manager, Domenico Villani, showing trust towards our group. Villani already signed the previous editorials as KEMA Labs EVP. So, starting from the Testingly current issue, the editorial is signed by Villani himself together with the new KEMA Labs EVP, Bas Verhoeven.

Bas started at KEMA in 1991 as R&D engineer. In 2000, he was appointed manager of the KEMA High Voltage Laboratory. From 2011, Bas had several senior management positions for HVL, HPL, and in sales. In 2020, he was responsible for the High Voltage Laboratories for Milan, Arnhem, Berlin, and Mannheim. Finally, in November 2022, he was appointed as the new Executive Vice President for KEMA Labs.

For this issue of Testingly, the KEMA Labs magazine wants to give an overview of the main innovative discussions held during the week of Cigrè 2022 in Paris. KEMA will also share a couple of windows on the world of laboratory tests that introduce what has recently been requested by the world of automation and digital measurement along with the innovation on the American market supported by our laboratories in Chalfont.

The section dedicated to emissions takes in consideration the realization of net-zero emissions electricity grids. It was a major topic of interest on CIGRE's conference, that traditionally focuses to electricity supply systems. While the energy generation mix will eventually tend to zero carbon footprint, the remaining CO2 equivalent will be due to SF6, stored in T&D equipment.

Another area to take in consideration is cables. Energy Transition is a pathway toward transformation of the global energy sector from fossil-based to zero-carbon by the second half of this century for a Sustainable World.

“The KEMA Labs Magazine, wants to give an overview of the main innovative discussions held during the week of CIGRE 2022 in Paris”

Bas Verhoeven – KEMA Labs, Executive Vice President

The Cable market is one of the hot sectors in the clean energy transition, as demand for products such as undersea HV lines leads to order backlogs of 2-5 years for cable makers portfolios.

In theme of digitalization, we present modern instrument transformers with alternative measurement techniques that are emerging for digital substation applications in the future grid. Given the risks derived from progressively incorporating digital solutions into the electrical grid infrastructure, utilities and network operators increasingly look for proof of quality when selecting new generation metering, protection, and substation automation equipment. KEMA Labs can support the manufacturers of this type of modern instrument transformers with testing of prototypes or end products according to the most relevant International Standards that have been recently published or will be published in the near future.

Finally, let’s look into the USA HV switchgear industry. Two products have recently been tested at KEMA Labs Chalfont (USA). One of these is particularly innovative, but the article provides information on both types of switches subject to peak resistance and short duration current tests according to IEEE Std C37.30.1-2011. These tests had to demonstrate the mechanical and thermal capability of the switches to ensure they meet the designed parameters.

Enjoy the read!

Domenico Villani – CESI Group CEO
Bas Verhoeven – Executive Vice President CESI TIC Division – KEMA Labs

Latest news from the TIC industry

Type Test for Smart Meters Certification

In June 2020, new versions of the EN-IEC product standards for electricity metering equipment, the EN-IEC 62052-11, EN-IEC 62053-21, -22, -23, and -24, were published.
Recently, KEMA Labs Metering, Protection & Substation Automation Laboratory in the Netherlands completed the first type test according to the new version standards.

Compared with the 2003 Editions, we should pay special attention to the new requirements when designing the meters. However, our colleagues have adapted to the new 2020 standards by implementing new test procedures and modifying existing test procedures/methods. Also, the product safety standard EN-IEC 62052-31 is implemented with state-of-the-art facilities for switch endurance testing at different power factors and switch short circuit testing up to 10.000 A, single fault testing, and safety assessment.
The project was successfully completed for the customer that can now showcase the latest certification according to the new standard.

Testing of 220kV 3-core Submarine Cable Systems

KEMA Labs High Voltage Labs team in Arnhem, The Netherlands, recently started the setup phase of a remarkable 220kV 3-core armored submarine cable system for a top leading firm with end user targeted in the off-shore wind business.

The cable system, together with factory and repair joints, will be subjected to a special test program according client requirements to test the performance of the cable system design. Test with 3-core current injection and 1 phase energized will reproduce the optimal testing conditions for this cable system.

KEMA Labs showcase as benchmark of competence, cutting-edge facilities and long tradition in the Cable business industry covering the entire value chain of its customers.

Testing of 245kV High Voltage Instrument Transformers at KEMA Labs Arnhem

KEMA High Voltage Labs team in Arnhem, The Netherlands, has recently completed a special accuracy measurement for a top leading customer in the field of the High Voltage Instrument Transformers.

The test object is a special High Voltage Instrument transformer equipped with a power core for the supply of auxiliary equipment within the High Voltage substations together with the classic Protection and Measurement cores.

The more requirements and performances requested to the equipment gets the top, the more KEMA Labs can showcase cutting edge facilities to support its clients.

Failure investigation

KEMA Labs has performed its first failure investigation on a three-core submarine cable connecting an offshore installation.

In this type of activity, a step-by-step approach is necessary by reorienting the work on the basis of the outcome of each previous stage. In the failure investigation, the faulted specimens have first been dissected in our laboratories. Even if the damage was supposed to be an internal dielectric breakdown, the laboratory analysis readdressed the investigation toward mechanical damage which was therefore identified as the root cause of the failure.

The result has been considered very useful for updating the installation procedure and avoiding such mechanical issues in future. The whole cable did not have to be replaced

Alternative Gas Switchgear manufactured by General Electric

EMISSIONS

Towards net-zero emissions electricity grids: recent updates from the CIGRE 2022 conference

In electricity generation, enormous steps and investments are ongoing to meet the internationally established CO_2 reduction targets. Not surprisingly, similar efforts are being accepted in the electricity delivery industry.

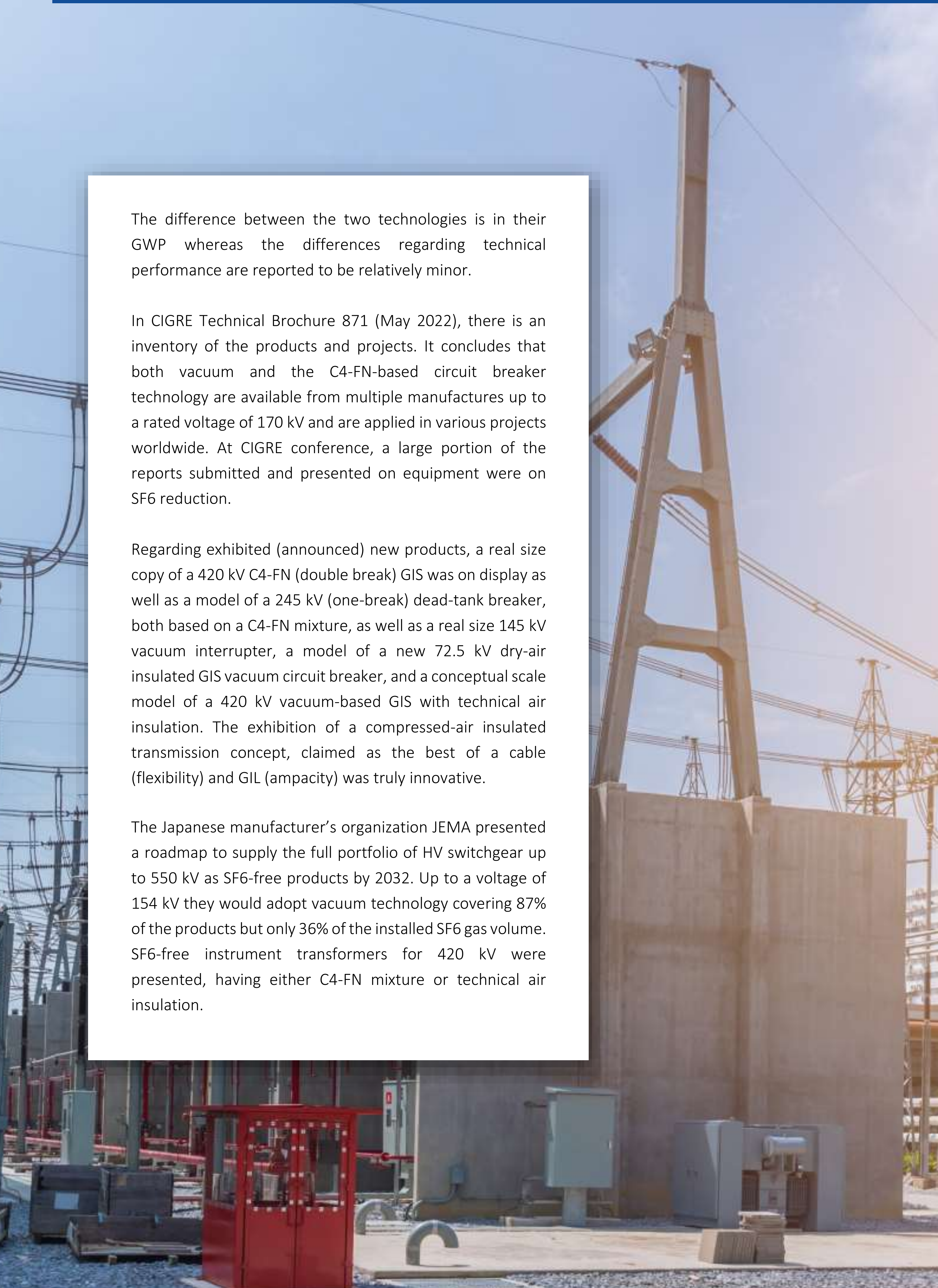
Realization of net-zero emissions electricity grids was a major topic of interest on last month's CIGRE conference, that traditionally focusses to electricity supply systems. At present, the biggest share (> 95%) of the CO_2 equivalent from T&D grids are transmission losses. While the energy generation mix will eventually tend to zero carbon footprint, the remaining CO_2 equivalent will be due to SF_6, stored in T&D equipment.

The past decades, it is recognized that SF_6 is the most potent man-made greenhouse gas, having a CO_2 equivalent (Global Warming Potential, GWP) of 25 200. This new number was assigned in the recent 6th IPCC

As a result, the industry is investing heavily to develop SF_6-free equipment. Even competitors join forces and share patents to realize this in a much shorter period than it took to reach technical maturity of their SF_6 predecessors.

Alternatives to SF_6 in T&D equipment are either based on natural-origin gases (GWP < 1) or consist of a mixture of CO_2, O_2, and a small fraction of fluoronitriles (C4-FN) or fluoroketones (C5-FK). The C4-FN mixtures have GWP in the range 300 – 750, and are mostly applied in transmission equipment, whereas C5-FK mixtures have GWP < 1 and are found in distribution. Every manufacturer has its own composition of this mixture which can even depend on the application, e.g., the minimum temperature.

When it comes to switching, high-voltage SF_6-free products are either switching in vacuum and have natural-origin gas insulation or have a C4-FN mixture for switching and insulation.



The difference between the two technologies is in their GWP whereas the differences regarding technical performance are reported to be relatively minor.

In CIGRE Technical Brochure 871 (May 2022), there is an inventory of the products and projects. It concludes that both vacuum and the C4-FN-based circuit breaker technology are available from multiple manufactures up to a rated voltage of 170 kV and are applied in various projects worldwide. At CIGRE conference, a large portion of the reports submitted and presented on equipment were on SF6 reduction.

Regarding exhibited (announced) new products, a real size copy of a 420 kV C4-FN (double break) GIS was on display as well as a model of a 245 kV (one-break) dead-tank breaker, both based on a C4-FN mixture, as well as a real size 145 kV vacuum interrupter, a model of a new 72.5 kV dry-air insulated GIS vacuum circuit breaker, and a conceptual scale model of a 420 kV vacuum-based GIS with technical air insulation. The exhibition of a compressed-air insulated transmission concept, claimed as the best of a cable (flexibility) and GIL (ampacity) was truly innovative.

The Japanese manufacturer’s organization JEMA presented a roadmap to supply the full portfolio of HV switchgear up to 550 kV as SF6-free products by 2032. Up to a voltage of 154 kV they would adopt vacuum technology covering 87% of the products but only 36% of the installed SF6 gas volume. SF6-free instrument transformers for 420 kV were presented, having either C4-FN mixture or technical air insulation.

Even more important is the acceptance of the technology by the transmission system operators (TSOs). In a crowded workshop dedicated to the subject, specialists gave an overview on the state-of-the art of technology and projects whereas eight asset managers shared views and experiences on their SF6 replacement strategies.

An important driver of future developments are regulations. The European Commission published a proposal in 2022, as a follow-up of its F-gas regulation (2014), to prohibit the installation and replacement of fluorinated greenhouse gases in switchgear in stages by voltage rating, until a total prohibition by Jan. 1, 2031. Herein, insulating and/or breaking media having a GWP $\geq$ 10 are prohibited unless evidence is provided that no suitable technical alternative is available in this range, in which case media up to GWP 2000 are permitted, thus excluding SF6 entirely. This proposal just went through a "public consultation" phase.

Its practicality was discussed seriously by TSOs, regarding new products placed on the market, risk of misunderstanding of maturity of products, availability of SF6 equipment spare parts, risk of ending up with stranded investments once a certain technology becomes "forbidden" unexpectedly or when certain technologies become obsolete after commissioning. An alternative suggestion is to consider life cycle assessment according to ISO 14025 rather than GWP of the gases only.

Several TSO expressed their intention to restrict themselves on the long run to equipment with natural-origin gas only. An even stricter (GWP shall be ≤ 1 without "reporting measures") SF6 phasing-out scheme ending Jan. 1, 2033, was legally adopted in California the beginning of this year.

Regarding SF6 replacement for insulation only, various projects were highlighted, showing the use of both synthetic air and C4-FN mixtures up to 420 kV in GIL/GIB. A Chinese project was reported of a 1000 kV GIL insulated by a C4-FN/CO2 mixture.

An interesting development is re-fill the existing SF6 GIS with an SF6 alternative gas. Projects (420 kV) were reported in which principal feasibility has been demonstrated. An important issue is material compatibility, since the "standard" gas mixtures with CO2 as carrier gas are not compatible with SF6- grade gaskets and seals. For these, the carrier gas N2 has better leakage performance.

High voltage vacuum interrupter by Mitsubishi

Regarding the attention to temperature rise performance, SF6 was found to be superior. It was demonstrated that after design adaptions the IEC requirements can also be met with the new gases.

For circuit breakers, re-fill is not an option. Since the physical properties of SF6 alternative mixtures are different from SF6, breaker chambers need a re-design. Projects were reported with a variety of gases and gas mixtures, most with and some without oxygen as admixture.
It was reported that for the foreseeable future, 245 kV seems to be the technical limit for single-break circuit breakers for both vacuum and C4-FN based technology. This has its impact on size and costs for higher voltage ratings, though one report claims a 420 kV double-break GIS circuit breaker having the same diameter as a single break SF6 breaker of similar rating.

A common challenge for operators remains the very rapid growth of installed equipment (for some at a rate of 100% in the coming decade) which means that despite efforts in reduction, the banked quantity of SF6 will increase in the years to come, even at minimum possible leakage.

For filling equipment, a variety of gas handling options is reported, like mixing at site, or supply of pre-mixed gas in gaseous or liquid state. Experiences are shared with pros and cons, most often depending on local conditions. CIGRE Working Group B3/A3.60 is collecting experiences and best practices in a user guide.

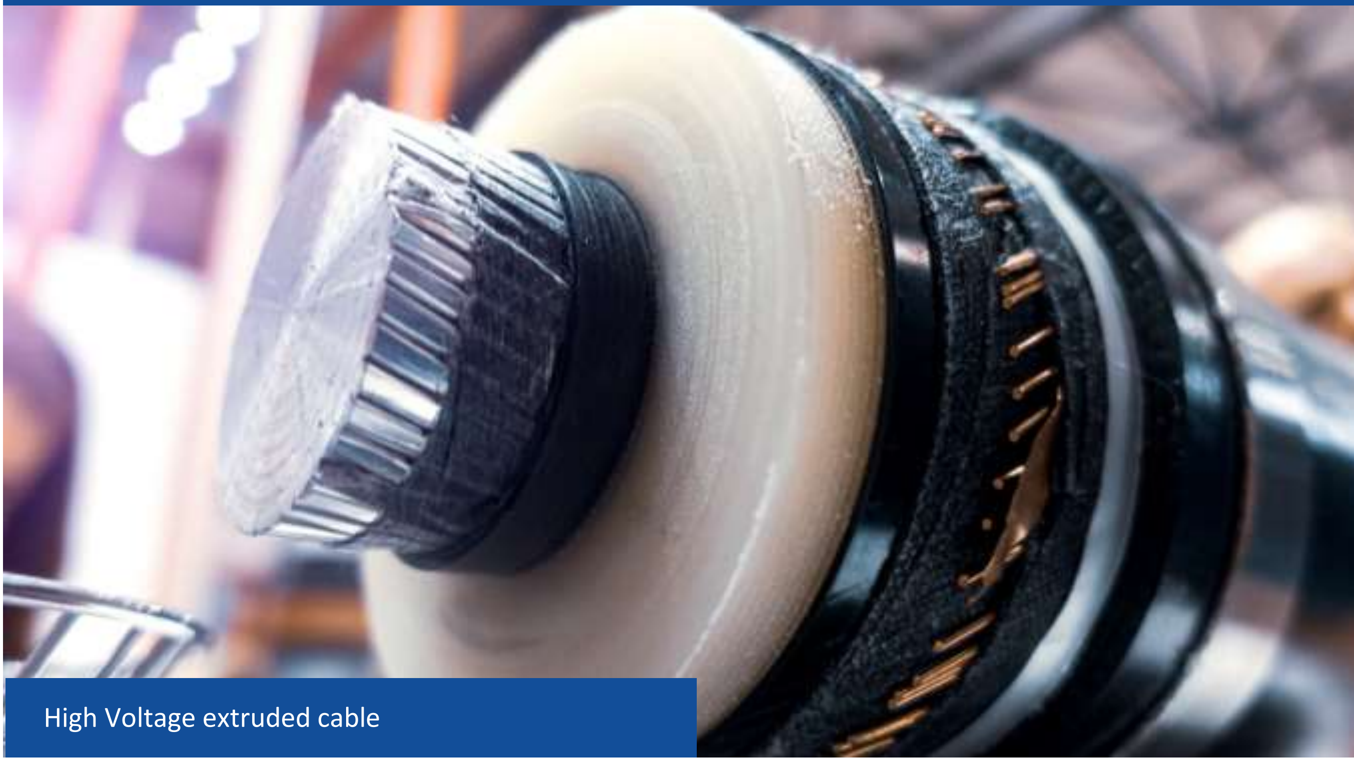
At decommissioning, toxicity of the synthetic gas mixtures is an issue, and the gas to be disposed of needs to be handled with similar precautions as "arced" SF6. Guidelines and data are collected in the new updated **IEC Standard 62271-4** (July 2022) and **IEEE PC37.122.10 (2019).**

Operators mention that "only IEC testing" of equipment might not be enough regarding uncertainty of lifetime performance. The IEC standards, though claimed to be applicable for all interruption and insulation media have not yet included the new media. Given the brief time to maturity, some call for additional proof of performance, for example, when it comes to lifetime performance, reliability over time, stability of gas composition and its ingredients, even to consider fallback options to SF6. better leakage performance.

As a general conclusion, there is no generic alternative of synthetic gases, or even a commonly agreed mixture composition at the horizon that can match the technical superiority of SF6. Nevertheless, thanks to adequate design modifications, similar technical performance is reported.

Industry is taking SF6 reduction very serious, as the updates of ambitious roadmaps towards SF6-free availability of equipment up to 550 kV demonstrate. System operators take their share in decarbonization by installing equipment, thereby stimulating the development of reliable "green" products and building up an experience database.
A firm commitment of all stakeholders seems to exist on not getting stuck in a Catch-22 situation of absence of development because of lack of demand and no demand because of not any development.

EconiQ SF6-free 420 kV circuit-breaker by Hitachi Energy



High Voltage extruded cable

CABLE

Insulated cables in CIGRE'

The 2022 CIGRE' Exhibit Session in Paris was an unexpected success in a context still marked by travel restrictions and because of the international sanctions imposed on Russia in response to its invasion of Ukraine.

Nevertheless, this Session will be remembered for the number of participants (about 3,700), delegates, exhibitors, and visitors, as well as for the number and quality of the contributions, speeches, and technical presentations. It will also be remembered for the shared happiness of the reunion after four years of forced separation of the members of the community, and for the desire to reconnect with the world of electrical systems.

We have had many contacts with customers and colleagues from all over the world, with interesting discussions on many products but, to choose a couple, we can say that the NO SF6 gases to decarbonize the electrical system and connections with electrical cables were the most discussed.

Energy Transition is a pathway toward transformation of the global energy sector from fossil-based to zero-carbon by the second half of this century for a Sustainable World and the **Cable market is one of the hot sectors in the clean energy transition**, as demand for products such as for example undersea HV lines leads to order backlogs of 2-5 years for cable makers portfolios.

Furthermore, the consequences of climate change that bring more frequent and intense storms, floods, heat waves, fires and other extreme events are under the eyes of all, consequently the use of underground cable networks will grow as the latter are more resistant to these climate-related risks.

The discussions we had in the electric cables sector concerned innovative projects in the low and medium voltage, but above all there were discussions of national or international connections both in AC and especially in DC.

In this respect, the Transmission System Operators (TSO) are looking for innovative solutions in the development of transmission networks and in recent years HVDC connections are having greater preferences not only for submarine cables but also for terrestrial applications, especially for long distances.

The number of HVDC interconnectors in the construction stage is larger than ever before. Also, there are many projects in progress at various preliminary stages (planning, studies etc), and they are typically very long and with higher power ratings, thus pushing voltages to new levels with new cable technologies.

HVDC connection in EU are mainly used as interconnectors in the Mediterranean area and both as interconnectors and connection of offshore windfarms in the North Sea. Many land and submarine interconnection projects have been announced and some have already started, such as Celtic Interconnector, Viking Link, Monita and so on. TERNA alone has in its portfolio 4 very important links soon: Adriatic Link, SACOI 3, Tunisia Link and Tyrrehenian Link.

CESI's TIC Division, KEMA Labs, is fully involved in the development of many of the projects (R&D, Type and PQT) just mentioned but is also directly involved in the development of important transnational projects that are progressing in the world such as the **SUNCABLE project** (Australia-Singapore) or the Morocco-UK project. In particular an important meeting on this project was held in our stand in Paris.

Aerial view of KEMA Powertest, LLC, Chalfont (Pennsylvania, USA)

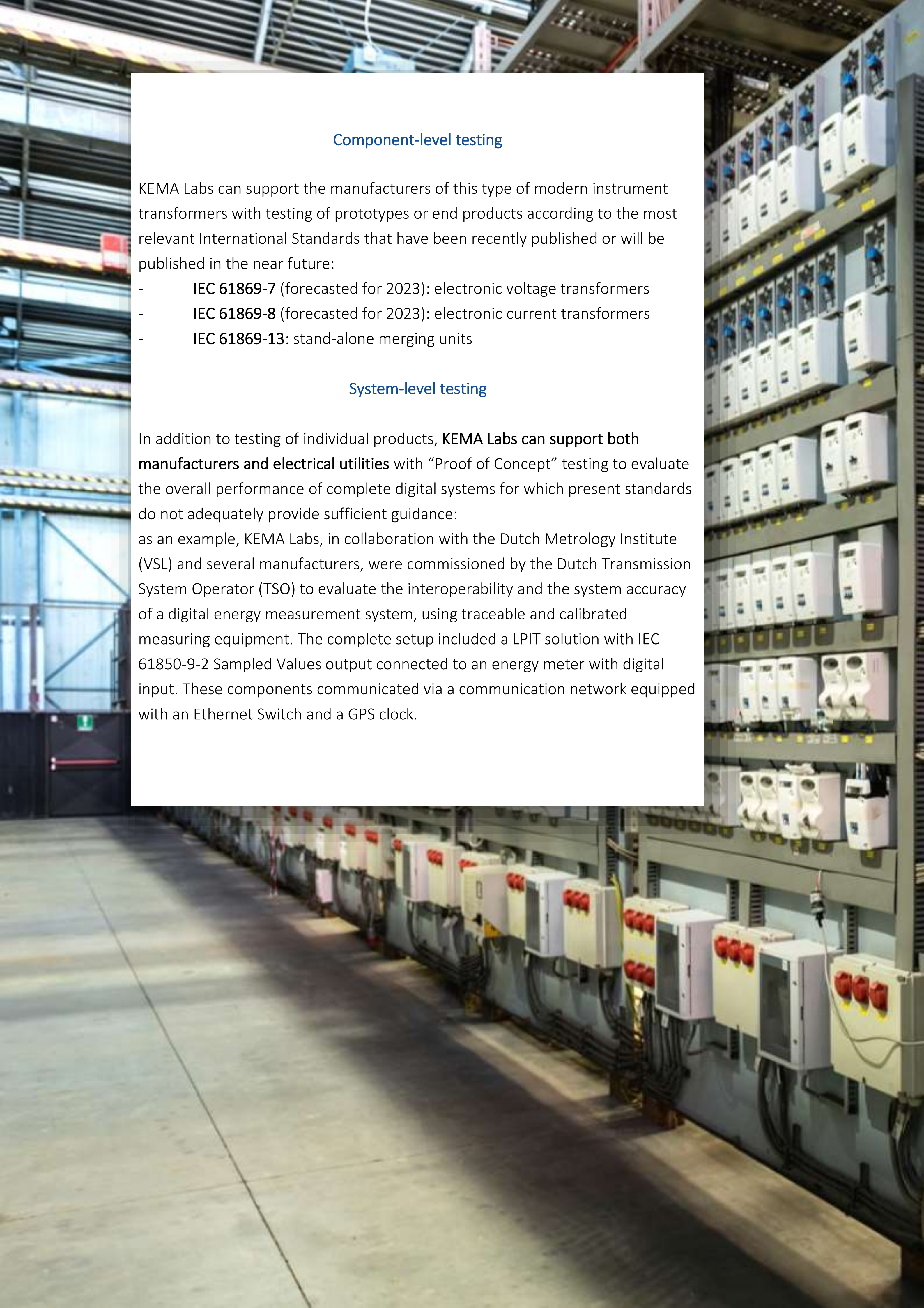
DIGITALIZATION

Electronic instrument transformers and merging units with IEC 61850-9-2 SV compatibility

Modern instrument transformers with alternative measurement techniques are emerging for digital substation applications in the future grid. In addition to providing full digital measurement data for metering and protection into the IEC 61850 process bus, electronic current/voltage transformers have also some interesting features compared to conventional instrument transformers like providing higher safety or reducing footprint and environmental impact. On the other hand, stand-alone merging units, a key element of the IEC 61850 process bus concept, convert the analogue signals from the conventional current/voltage transformers into IEC 61850 Sampled Values, contributing to a full digital substation.

Given the risks derived from progressively incorporating digital solutions into the electrical grid infrastructure, utilities and network operators increasingly look for proof of quality when selecting new generation metering, protection, and substation automation equipment.

KEMA Labs actively participates in the developments within the international standardization organizations dealing with instrument transformers and, as a result, is committed to help ensure the safety, robustness, and performance of these new generation components.



Component-level testing

KEMA Labs can support the manufacturers of this type of modern instrument transformers with testing of prototypes or end products according to the most relevant International Standards that have been recently published or will be published in the near future:

- **IEC 61869-7** (forecasted for 2023): electronic voltage transformers
- **IEC 61869-8** (forecasted for 2023): electronic current transformers
- **IEC 61869-13**: stand-alone merging units

System-level testing

In addition to testing of individual products, **KEMA Labs can support both manufacturers and electrical utilities** with "Proof of Concept" testing to evaluate the overall performance of complete digital systems for which present standards do not adequately provide sufficient guidance:
as an example, KEMA Labs, in collaboration with the Dutch Metrology Institute (VSL) and several manufacturers, were commissioned by the Dutch Transmission System Operator (TSO) to evaluate the interoperability and the system accuracy of a digital energy measurement system, using traceable and calibrated measuring equipment. The complete setup included a LPIT solution with IEC 61850-9-2 Sampled Values output connected to an energy meter with digital input. These components communicated via a communication network equipped with an Ethernet Switch and a GPS clock.

Customer equipment

CASE HISTORY

Testing of an Industry Innovation for Cleaveland/Price Inc

Cleaveland/Price Inc, **a long-time client of KEMA Labs**, once again engaged the services of the lab to perform short-circuit withstand tests on two new products to be introduced to the market. **The two products are: a 245 kV 4000 A high voltage center break single-pole switch and a 245 kV 2000 A high voltage vertical break in-line motor operated single-pole switch**.

Working with our sales team, Cleaveland/Price signed an agreement with KEMA Labs at Chalfont to provide very specific short-circuit current withstand tests for the two types of switches above.

The 245 kV 4000 A high voltage center break single-pole switch consists of a ground bypass.

Of particular importance to this article is the 245 kV 2000 A high voltage vertical break in-line motor operated single-pole switch. This product is a unique addition to the high voltage switchgear industry.

According to product literature the switch requires no mounting structure thereby providing savings in installation cost. It is directly inserted into a transmission line by means of a polymer strain insulator. It is also equipped with a solar-powered motor with capabilities to be operated by encrypted radio command. In addition, it can be manually operated using a small hand crank assembly. It is often used to automate 3-phase utility systems. As a safety mechanism the switch features a lock-out system when performing line maintenance.

Both types of switches were subjected to both peak withstand and short-time withstand current tests according to IEEE Std C37.30.1-2011. These tests were to demonstrate the mechanical and thermal capability of the switches to ensure they meet the designed parameters.

Two different test setups were employed. The first consisted of two **245 kV 4000 A high voltage center break single-pole switch** in series with one each on the longer arm of a rectangular shaped (plan view) test setup. The second setup replaced one of the switches in the first setup with the 245 kV 2000 A high voltage vertical break in-line motor operated single-pole switch.

Client had a specified space requirement for the test setup. The setup required a space of at least 454.25 inches by 256.75 inches. This space requirements fits directly into one of the low voltage cells of the Lab.

The center-break switch was subjected to 195 kA peak current and 75 kA symmetrical rms current for 3 seconds. Whereas the vertical break switch was subjected to 114 kA peak current and 44 kA symmetrical current for 3 seconds. KEMA labs was able to provide these circuit parameters with ease. On the preparation side of the work, the testing team worked with the client to ensure a safe environment for test setup. This ongoing collaboration ensured that the testing process was smooth and that their test objectives were achieved. Client obtained valuable information from this testing evolution of these products.

The success of these tests once again proves KEMA Labs' capabilities, and the important role short-circuit testing plays in ensuring product safety.
KEMA Labs' role in providing the physical and technical capability to perform these types of tests for our customers makes us unique in the power industry. Our talented staff always go the extra mile to ensure we provide the best of services to client. Our goal is always to be second to none. The success of these tests clearly demonstrates these commitments.

Overview of customer equipment

Paolo Miolo

KEMA LABS

Sales & Marketing KEMA Labs Director

- Innovation for the HVDC business
- Empowerment customer communications

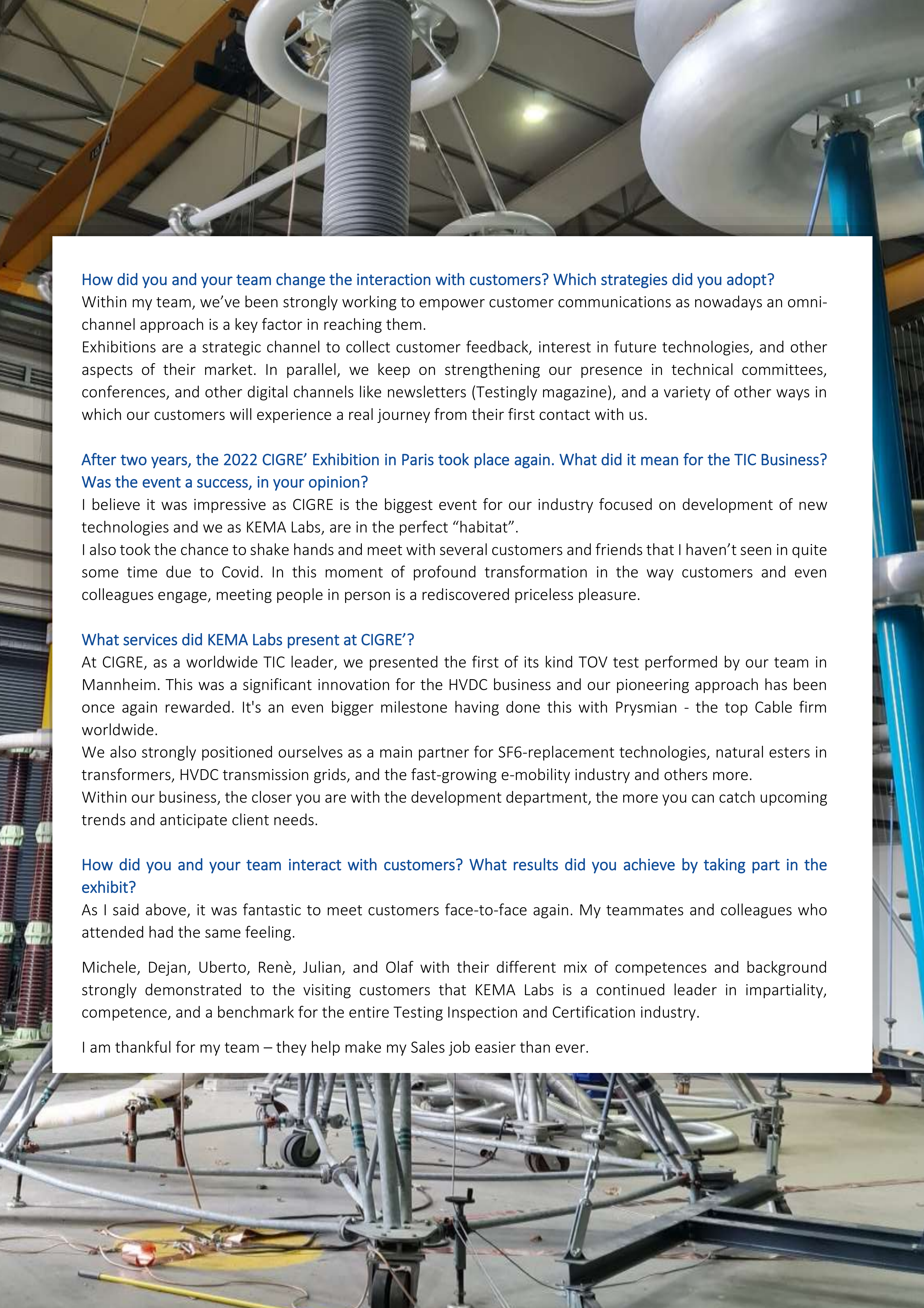
Paolo Miolo was born in 1967, received the Doctor's degree in Electrotechnical engineering from the Padova University in 1994. Working for more than 20 years in the energy sector, after a technical training and experience in HV equipment he has started a commercial career in Coelme first and later on in Alstom Grid where he grows up to the role of country sales director. Since 2014 he is engaged in CESI as marketing and sales direct of the testing division, with laboratories in Milano, Berlin, and Manheim.

Can you tell us about your role at KEMA Labs? How has your career progressed in CESI/KEMA?

I am the sales director of the Testing Inspection and Certification Division, better known as KEMA Lab. I coordinate a team of about 50 people whose task is to convince our clients to do business with us. This is, in my opinion, the best job in the world, because it allows you to keep very close contact with the evolution of the market and customers while consolidating product knowledge. No two days are the same.

I joined Cesi in 2014, and I have always maintained this role, although you can hardly say that the work has been the same. At the beginning of my career, the focus was on racing against competing labs, whereas currently all competitive paradigms have broken down and we find ourselves playing in a much more fluid atmosphere, where partnership with customers and end users matters more, and the challenge is to keep the group focused, able to act in a larger and more intense global perimeter, and to act more and more autonomously.

In this regard, I have to say that Cesi has always supported my ideas and I am privileged to have encountered very talented people in the team, both humanly and professionally.



How did you and your team change the interaction with customers? Which strategies did you adopt?

Within my team, we've been strongly working to empower customer communications as nowadays an omni-channel approach is a key factor in reaching them.

Exhibitions are a strategic channel to collect customer feedback, interest in future technologies, and other aspects of their market. In parallel, we keep on strengthening our presence in technical committees, conferences, and other digital channels like newsletters (Testingly magazine), and a variety of other ways in which our customers will experience a real journey from their first contact with us.

After two years, the 2022 CIGRE' Exhibition in Paris took place again. What did it mean for the TIC Business? Was the event a success, in your opinion?

I believe it was impressive as CIGRE is the biggest event for our industry focused on development of new technologies and we as KEMA Labs, are in the perfect "habitat".

I also took the chance to shake hands and meet with several customers and friends that I haven't seen in quite some time due to Covid. In this moment of profound transformation in the way customers and even colleagues engage, meeting people in person is a rediscovered priceless pleasure.

What services did KEMA Labs present at CIGRE'?

At CIGRE, as a worldwide TIC leader, we presented the first of its kind TOV test performed by our team in Mannheim. This was a significant innovation for the HVDC business and our pioneering approach has been once again rewarded. It's an even bigger milestone having done this with Prysmian - the top Cable firm worldwide.

We also strongly positioned ourselves as a main partner for SF6-replacement technologies, natural esters in transformers, HVDC transmission grids, and the fast-growing e-mobility industry and others more.

Within our business, the closer you are with the development department, the more you can catch upcoming trends and anticipate client needs.

How did you and your team interact with customers? What results did you achieve by taking part in the exhibit?

As I said above, it was fantastic to meet customers face-to-face again. My teammates and colleagues who attended had the same feeling.

Michele, Dejan, Uberto, Renè, Julian, and Olaf with their different mix of competences and background strongly demonstrated to the visiting customers that KEMA Labs is a continued leader in impartiality, competence, and a benchmark for the entire Testing Inspection and Certification industry.

I am thankful for my team – they help make my Sales job easier than ever.

Upcoming events

DISTRIBUTECH International 2023

February 7-9 2023

San Diego, USA

DistribuTECH International is the leading annual transmission and distribution event that addresses technologies used to move electricity from the power plant through the transmission and distribution systems to the meter and inside the home or business.

ELECRAMA 2023

February 18-22, 2023

Greater Noida, India

ELECRAMA brings together the complete spectrum of solutions that powers the planet from source to socket and everything in between. Featuring not just equipment & technology, but peerless thought leadership platforms for everything electric – from technical conclaves to industry summits.

Middle East energy

March 7-9, 2023

Dubai, UAE

Middle East Energy has helped the energy community find solutions that empower the rapid acceleration of electricity consumption across the Middle East.

CIRED 2023

June 12-15, 2023

Rome, Italy

CIRED, the Leading Forum where the Electricity Distribution Community meets, holds the major International Electricity Conference & Exhibition every two years in different venues in Europe with a worldwide perspective and participation.

KEMA Labs is the CESI Testing, Inspection and Certification Division

Through its Division KEMA Labs, CESI is the world leader for the independent Testing, Inspection and Certification activities in the electricity industry. With a legacy of more than 60 years of experience, CESI operates in 70 countries around the world and supports its global clients in meeting the energy transition challenges. CESI also provides civil and environmental engineering services.

The company's key global clients include major utilities, Transmission System Operators (TSOs), Distribution System Operators (DSOs), power generation companies (GenCos), system integrators, financial investors, and global electromechanical and electronic manufacturers, as well as governments and regulatory authorities.

CESI is a fully independent joint-stock company headquartered in Milan and with facilities in Arnhem (NL), Berlin (DE), Prague (CZ), Mannheim (DE), Dubai (AE), Rio de Janeiro (BR), Santiago de Chile (CL), Knoxville (US) and Chalfont (US).

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