



ENERGY GENERATION

INDUSTRY & TECHNOLOGY

Renewables

Concentrated solar power
Hydro & marine systems
Wind energy

TECHNICAL COMMITTEES

Review of 2010-2011

TC work from transport to
ultrasonics
robots to e-books

IEC WORLD

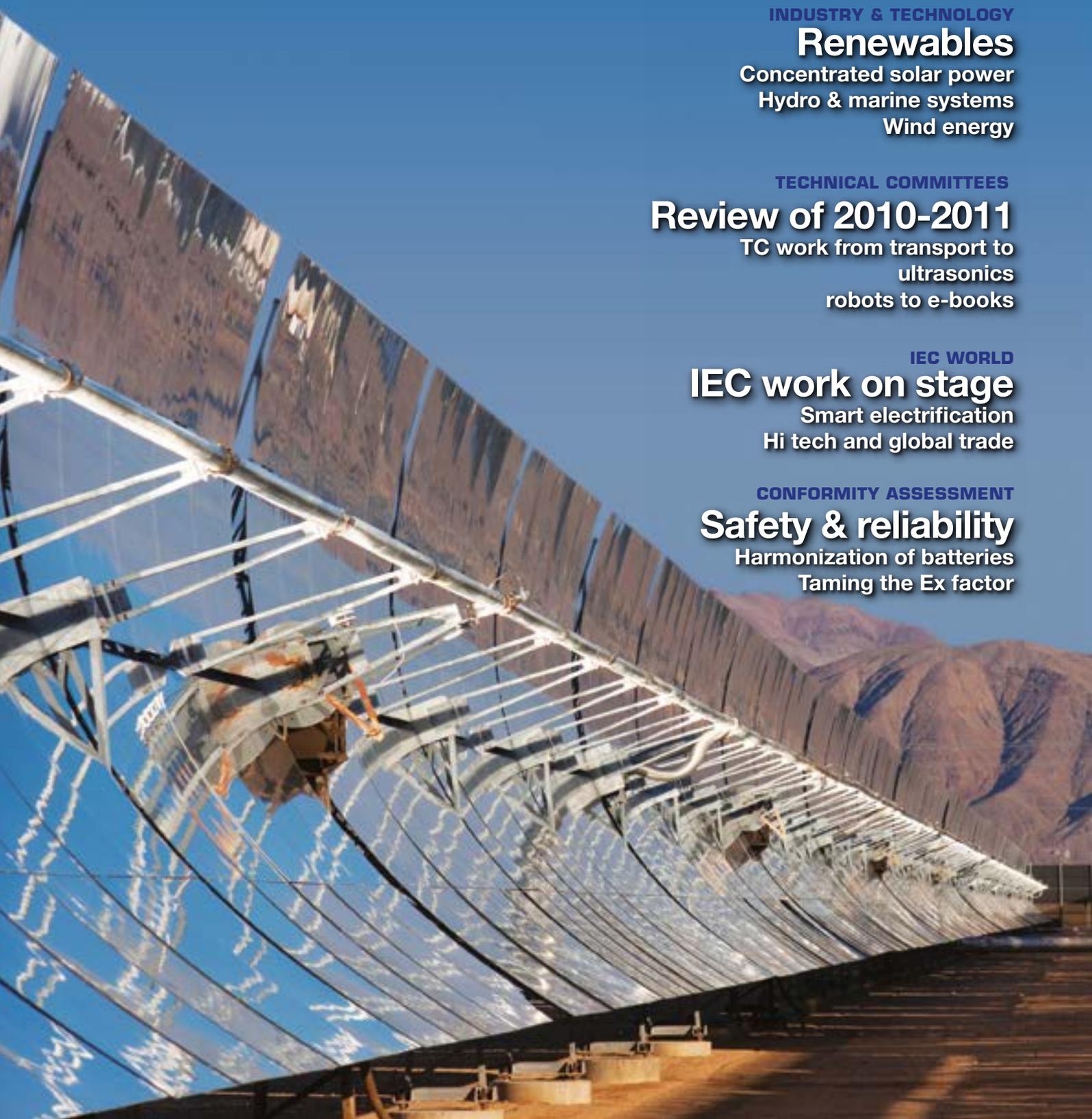
IEC work on stage

Smart electrification
Hi tech and global trade

CONFORMITY ASSESSMENT

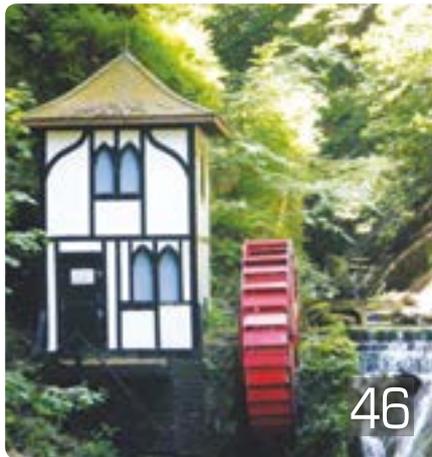
Safety & reliability

Harmonization of batteries
Taming the Ex factor





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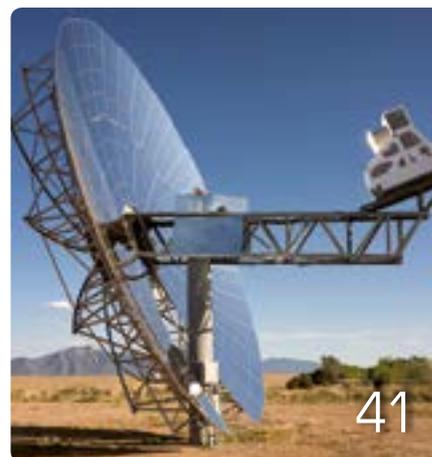
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**Focus of the month:
Energy generation**

Global energy needs are on the rise. Coupled with the diminishing supply of fossil fuels there is greater awareness of environmental and safety concerns. Renewable energies are likely to take an increasingly large share of the future energy mix.

IEC WORLD

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TECHNICAL COMMITTEES

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Editorial

A clear mission and vision and the need to spread the word



IEC International Standards and CA (Conformity Assessment) Systems are fundamental to international trade. Today, most companies who want to build products that will be accepted worldwide use IEC International Standards and CA Systems, and the 154 signatory states of the WTO (World Trade Organization) refer to them for issuing legislation and regulation concerning these products.

The scientists and engineers who founded the IEC understood the need for International Standards: they enable products to be built that are able to work together safely in as many places as possible. In many ways, the IEC is the home of industry: it helps small and big companies reach a broader range of markets faster and at lower cost than would otherwise be possible.

But not all is rosy. While a large number of companies use IEC International Standards and CA Systems successfully, we are still not on the radar screen of some CEOs. Today, the majority of industry leaders have an economic or financial background and standardization has simply not formed part of their education. As a result, many still lack understanding of the strategic advantage of active participation in IEC work. To change this, the IEC is increasing its level of engagement with leaders in industry, business and government and is building its relationships with academia to help educate the leaders of tomorrow.

But the IEC needs to improve how it anticipates and satisfies market needs still further. With converging technologies, industry increasingly demands a systems-based approach. By providing the right deliverables in a timely fashion – and by cooperating with relevant partner organizations – we will not only be able to attract more participants in new areas of technical work, but we will also increase our relevance to industry leaders.

The IEC has a clear mission and vision. It is expressed in the *Masterplan* which will be presented to all IEC members and delegates at the General Meeting in Melbourne.

See you in Melbourne.

Ronnie Amit
IEC General Secretary and CEO



Distinguishing between SMB entities

From Sector Boards to Advisory Committees and Strategic Groups

The SMB (Standardization Management Board) is the decision-making body of the IEC. It reports to the CB (Council Board).

In its role as the main decision-making entity of the IEC, SMB, until recently, had three types of sub-groups reporting to it, each with its own specific terms of reference. These were:



- **SBs (Sector Boards)**

A group, particularly representative of a particular industrial sector, and consisting in principle of members with no role in TC (Technical Committee) work. SBs were responsible for providing information to SMB about the market relevance of IEC International Standards so as to enable it to set technical work priorities and strategy.

- **ACs (Advisory Committees)**

Three ACs on environmental issues (ACEA), electromagnetic compatibility (ACEC) and safety (ACOS) advise, guide and coordinate IEC technical work – under the auspices of the SMB – in their respective areas with the aim of ensuring consistency throughout. Membership of the ACs is principally from the TCs that are involved with the matters being discussed by the AC.

- **SGs (Strategic Groups)**

Strategic groups have been set up to provide strategic guidance to the SMB particularly on new areas of interest to the IEC. They are intended to have a defined lifespan with the task of making recommendations on the organization and initiation of the work in their area of responsibility.

SG 1 Energy efficiency and renewable resources

SG 2 Standardization of Ultra High Voltage Technologies (UHV)

SG 3 Smart Grid

SG 4 LVDC distribution systems up to 1500V DC

Cutting down on sub-entities

Now, in an aim to cut down on the number of sub-entities reporting to SMB

and to stream line their activities, SMB has decided to retain only the SGs and the ACs, transforming the SBs into ACs. SGs are responsible for longer-term work and setting up work in new fields, introducing new technologies that, once initiated, can then be taken over by the latter, the ACs who, essentially, are responsible for the technical coordination of current work.

Making this clear distinction rationalizes the tasks of the two groups who now have very clear terms of reference.

As a result, the former SB 1 has been transformed into ACTAD (Advisory Committee on Electricity Transmission and Distribution) and SB 4 is now ACTEL (Advisory Committee on Telecommunication).

SGs and ACs continue to report to the SMB. SMB expects that members of SGs will generally be corporate technical experts, perhaps even from outside the standardization world. AC members will predominantly be experts in TCs, or experts in the particular areas concerned who have been nominated by NCs (National Committees) in the particular areas concerned.

A new SG to look after the needs of older citizens

During their June meeting in Stockholm, SMB agreed to set up a fifth SG. SG 5 AAL (Ambient Assisted Living) is to provide strategic guidance and map out the specific areas of technical activity that relate to the quality of life of older people, particularly where using ICT (Information and Communication Technology) is involved in supervising or assisting with their daily life. In many cases, assisted living provides an alternative option for senior people who, although they do not require full-time medical care, can no longer rely on living entirely independently.

IEC work on stage

Demonstrating why your contributions are important

Throughout the year, IEC officers and senior management participate in a large number of strategic events and meetings all over the globe. Their aim is to raise awareness and increase understanding of the importance of IEC work; the positive impact it has on global trade and the help it provides in addressing the energy challenge.

The presentations that IEC management and senior officers give to professional and lay audiences at strategic events and meetings around the world have a number of focuses. They explain how the IEC enables global trade and allows companies to do business more efficiently and at lower cost; why IEC work provides the technical foundation for energy efficiency and

helps reduce standby energy consumption; and why IEC know-how and initiatives are important for the Smart Grid and support the roll-out of EVs (Electric Vehicles). IEC officers also participate in major meetings of partner organizations and help celebrate important member events. Here are some highlights of the last year:

Smart electrification – addressing the energy challenge

WORLD ENERGY CONGRESS

Following the launch of the IEC White Paper *Coping with the Energy Challenge: the IEC's role from 2010 to 2030* at the World Energy Congress in Montreal in September 2010, the IEC presented its vision of smart electrification at major congresses all around the world.

(Full article in *e-tech* October 2010)

G20 SUMMIT KOREA

At the G20 Summit in Korea, the IEC described how its international experts, who come from all over the world, can contribute to addressing the energy challenge by providing a solid technical foundation for all energy efficiency projects.

(Full article in *e-tech* December 2010)

COP 16 AND WORLD ECONOMIC FORUM, CANCUN, MEXICO

At COP (Conference of the Parties) 16 in Cancun, Mexico, the United Nations Framework Convention on Climate Change, the IEC was invited to talk about its vision during an informal gathering of world economic leaders from India, the United States, China, South Africa, the Republic of Korea and the European Union that was hosted by the WEF (World Economic Forum).

(Full article in *e-tech* December 2010)



High-tech and Global Trade

WORLD ELECTRONICS FORUM

Energy efficiency and smart electrification are not the only topics the IEC has addressed before major audiences. At the World Electronics Forum, the IEC spoke to electronics leaders from 22 countries, underlining the importance of International Standards for aiding innovation and global trade in electronics. The Forum was hosted by CEA (Consumer Electronics Association) and took place in parallel with CES® (Consumer Electronics Show) in Las Vegas, US (United States) in January 2011. (Full article in *e-tech* January/February 2011)



IEC immediate Past President Jacques Régis

ABINEE

At the end of March, IEC President Klaus Wucherer was invited by ABINEE, who organizes the key electronics industry event in South America, to deliver a keynote speech and inform 500 guests drawn from industry and government about IEC contributions to global trade in high-tech electronics. ABINEE represents more than 650 national and international companies that participate in its activities. (Full article in *e-tech* May 2011)



IEC President Klaus Wucherer

Electric Vehicles

IEC AND e8 ROUND TABLE

In January 2011, the IEC and e8, a global organization of 10 world-leading electricity companies, organized the first strategic round table to bring together all major global automotive manufacturers, electric equipment suppliers and utilities, co-ordinating their work around EVs (Electric Vehicles) (see detailed article on EVs in this *e-tech*). (Full article *e-tech* January-February 2011)



IEC and e8 first international round table

FULLY NETWORKED CAR

During the 6th WSC (World Standards Cooperation) *Fully Networked Car* workshop at the Geneva International Motor Show, the IEC underlined the importance of International Standards for the successful roll-out of EVs. (Full article in *e-tech* April 2011)



e8 UN-ENERGY SUMMIT

In June, IEC Immediate Past President Régis and former IEC Vice-President Kitzantides attended the e8 UN-Energy Summit in New York City. Their participation at the event allowed the IEC to raise the visibility of its engagement for improved energy accessibility and its work towards a global roll-out of EVs. In a joint statement, distributed to more than 200 participants at the Summit, the IEC and e8 were able to highlight the promising outcomes of the strategic round table that they had organized jointly in January. (Full article *News log* June 2011)



EVs from urban to sports car

Smart Grid

The Smart Grid represents the essence of the IEC's business and is one of the first areas in which a systems approach to standardization is being put in place. It is therefore not surprising that the IEC participates in a large number of Smart Grid events and forums throughout the year.

GRIDWEEK

One of the key events in this field is GridWeek. This takes place once a year in Washington DC and is sponsored by the IEC. The aim of this endorsing partnership is to increase awareness about IEC work in the area of Smart Grids and to stimulate global cooperation and standardization in this area.

(Full article in *e-tech* November 2010)



Academia

WSC ACADEMIC DAY

The Academic Day organized by WSC (World Standards Cooperation), which was established in 2001 by the IEC, ISO (International Organization for Standardization) and ITU (International Telecommunication Union), took place this year in Hangzhou, China, in June 2011 in conjunction with the ICES (International Cooperation on Education and Standardization) workshop. At the event, the IEC was able to network with key people involved in research, business and intellectual property in academic institutions from around the world. The objective of Academic Day is to raise the profile of standardization among students, young professionals and future business leaders in collaboration with their teaching staff.

(Full article in *e-tech* August/September 2011)



Speaking at Academic Day

Important regional events

APEC

The IEC was invited by the US Department of Commerce and APEC (Asia-Pacific Economic Cooperation) to participate in a round table event entitled "*Challenges in Engaging Regulators and other Stakeholders in Standards Development and Use*". This took place in March 2011 at the 6th Conference on GRP (Good Regulatory Practice), which was held in Washington DC. The round table session focused on how to promote standardization activities, how to attract regular participation in standards development and, more generally, how to increase participation from APEC member countries. The platform provided a good opportunity to explain the IEC consensus-based process of standards development.

(Detailed article in *e-tech* May 2011)



White House, Washington DC



Former IEC Vice-President, Frank Kitzantides

CANENA

In March, Former IEC Vice-President Frank Kitzantides participated in the annual meeting of CANENA (Council for the Harmonization of Electrotechnical Standards of the Nations of the Americas) in San Antonio, Texas. Kitzantides provided an update to key IEC topics and activities and underlined the need for a focused effort to involve, at an early stage of their career, those who will become tomorrow's experts in the world of standardization. He spoke about IEC efforts in this area, notably the Young Professionals' Programme, which provides participants with an international networking platform and allows them to exchange ideas and get involved in shaping the future of international standardization and conformity assessment.

(Full article in *e-tech* April 2011)



IEC General Secretary and CEO Ronnie Amit (left) with COPANT President Sergio Toro

COPANT

IEC General Secretary and CEO Ronnie Amit and IEC Vice-President and SMB Chairman Jim Matthews were present at the COPANT (Pan American Standards Commission) General Assembly in May in Santiago, Chile. The two-day event brought together 74 delegates from the Americas; they came from public and private sector standardization organizations and represented 18 COPANT member states. The IEC updated stakeholders from this increasingly important region of the world about key IEC activities and the Affiliate Country Programme.

The energy efficiency workshop that was hosted by INN (the Chilean National Institute of Normalization) in conjunction with the COPANT General Assembly, attracted an important number of local participants and achieved good media coverage, notably regarding Matthews' presentations on IEC work in the area of energy efficiency.

(Full article in *e-tech* June 2011)



Flag of the Republic of Azerbaijan

EASC

In May, Immediate Past President Jacques Régis spoke at the 39th session of the EASC (EuroAsian Interstate Council for Standardization, Metrology and Certification) in Avaza, Turkmenistan. The Caucasus and Central Asia regions are in the process of building up their industrial infrastructures; in his keynote address, Régis was able to explain how IEC International Standards and CA (Conformity Assessment) Systems can help in this task while also reducing barriers to export. Régis' visit to Turkmenistan and outline of the Affiliate Country Programme in Russian at the event resulted in an additional positive outcome: it convinced Azerbaijan to join the Programme.

(Full articles in *e-tech* June and August/September 2011)



Dennis Chew, Regional Director IEC-APRC

PASC

In March, Dennis Chew represented the IEC at PASC (Pacific Area Standards Congress), which held its 34th meeting in Bangkok, Thailand. Chew updated the 24 PASC members present at the event on IEC work, including in the areas of EVs and Smart Grids. He also underlined the growth of IEC CA Systems and informed members about the recent endorsement of IECEx by the United Nations via UNECE (United Nations Economic Commission for Europe). The Commission has issued a "Common Regulatory Framework" for hazardous areas, recommending IECEx as the world's best-practice model for the verification of conformity to International Standards. The framework is ready for adoption by developed and developing nations and should allow widespread access to safer Ex equipment. This is an important step in helping to reduce explosion risks and better protect workers and populations, whatever the market size.

(Full article in *e-tech* May 2011)

Globally engineered – locally competitive

IEC helps companies to compete more efficiently and globally

IEC Global Visions enables industry leaders such as Bosch, Hitachi, Mitsubishi Electric and Intertek, and research institutes such as AIST (National Institute of Advanced Industrial Science and Technology), to express why they support active participation in IEC work.

Over the past months, the IEC has continued interviewing global leaders from industry and governmental institutions about the challenges they face and how their involvement with the IEC helps them to run their businesses more efficiently.

All of them agree: participation in IEC standardization work and use of IEC Conformity Assessment Systems allows them to accelerate innovation. They can move faster and spend less money bringing new products to market.

The increasing complexity of supply chains means that it can be a challenge to build the right levels of quality, safety, performance and interoperability into any given product. Since IEC International Standards ensure that interoperability and safety are inbuilt and applicable

on a global scale, companies are able to optimize production and supply the right level of product quality specific to each region and customer. Safe and efficient product functionality does not necessarily imply that every possible feature has to be included: in hot regions, resistance to extreme humidity may be indispensable, while the requirement to function accurately in severe cold may be superfluous.

All of the companies we interviewed confirmed that their participation in standardization work allows them to stay competitive, while advance knowledge of the relevant standards under development allows them to anticipate changes that will be required. It also helps them to assess the competition, avoid duplication and not waste money and resources on unnecessary product variations.

With the convergence of technologies, the acceleration of innovation and the growing need for cooperation on challenges that span the globe, industry leaders increasingly look to the IEC to deliver the tools that allow them to reach the globe.

Here is what industry leaders would tell a company that is not actively involved in IEC standardization work:



“ Don’t wait for a standard to be decided and then become a user. Participating in the standardization process helps accelerate your business...Hitachi wants to actively participate in global standard setting for any standard that is related to Hitachi products and activities. ”

DR NAOYA TAKAHASHI
Vice President and Executive Officer, Hitachi Ltd.





“ Not to participate in international standardization – for any company – is a big mistake. I think this is really short-term thinking. You have to imagine what kind of double work you have to do, what kind of additional efforts you have to spend when you have different standards in different markets. You can use these efforts much better for real development instead of producing different products according to different standards in different markets.”

FRANZ FEHRENBACH
Chairman, Board of Management,
Robert Bosch GmbH.



“ If you had asked me thirty years ago, when I was working in the industry, what I thought of standards, I might have said that standardization is not necessary and that it hinders technological advancement. However, we now live in a time where speed is very important... in this context, standards play a very important role and help promote innovation and allow Japanese companies to compete more efficiently.”

DR TAMOTSU NOMAKUCHI
President AIST (National Institute of Advanced Industrial Science and Technology) and Chair of the Technology Council of JISC (Japanese Industrial Standards Committee).



“ High-level standards take into account global relevance and the best of them are the result of discussions between many people from different companies and backgrounds that bring the right level of expertise and experience to the table.”

DR KAZUO KYUMA
Executive Vice President
and Group President
Semiconductor & Device,
Mitsubishi Electric.



Participation and dialogue

Representation of IEC Regional Centres at key events

Both IEC-APRC (Asia-Pacific Regional Centre) and IEC-LARC (Latin America Regional Centre) are key to the development and promotion of the IEC in their region. They help raise awareness at the national and regional levels, present IEC standardization and conformity assessment activities, encourage active participation in IEC work and develop networks. In the past 12 months, Dennis Chew, Regional Director IEC-APRC, and Amaury Santos have represented the IEC at many important events and made several country visits to IEC members and Affiliates.

Asia

ASEAN

Dennis Chew, Regional Director IEC-APRC (IEC Asia-Pacific Regional Centre), accompanied Françoise Rauser, IEC Affiliate Country Programme Secretary, who – exceptionally this year – represented the IEC at the ASEAN (Association of Southeast Asian Nations) ACCSQ (ASEAN Consultative Committee on Standards and Quality) meeting held in Siem Reap, Cambodia, in March 2011. An update on IEC activities and its Affiliate Country Programme was presented to the ASEAN assembly. IEC member countries in the region were invited to offer their support and mentor the countries that are participating in the IEC Affiliate Country Programme.

Six of the 10 ASEAN countries are IEC members: Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam. Four are Affiliates: Cambodia, Myanmar, Lao PDR and Brunei Darussalam. The latter two countries

were granted Affiliate Plus status in 2009 and 2010 respectively.

Prior to attending the ASEAN meeting, they travelled to Vientiane, Lao, to provide training and guidance to the Lao NEC (National Electrotechnical Committee) and its stakeholders and stress the importance of actively participating in the Affiliate Country Programme.

In Cambodia, a special session was organized with ISC, the Institute of Standards of Cambodia, to help the country establish their NEC and upgrade to Affiliate Plus status.

APEC

Dennis Chew also participated in the APEC Joint Regulatory Advisory Committee on Electrical and Electronic Equipment Industry Seminar, in Chicago, USA, in May 2011.

APEC (Asia-Pacific Economic Cooperation) is a forum for 21 Pacific Rim

countries that seeks to promote free trade and economic cooperation throughout the Asia-Pacific region. The APEC members are: Australia, Brunei, Canada, Chile, China, Hong Kong, Indonesia, Japan, South Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, the Philippines, Russia, Singapore, Chinese Taipei, Thailand, USA and Vietnam.

The location of APEC meetings rotates annually among the member economies. In 2011 it was the turn of the USA to host the series of meetings.

Latin America

INN seminar focuses on IEC CA

As part of the Chilean NC's official inauguration ceremony held on 5 April 2011 in Santiago de Chile, the NC held a Conformity Assessment seminar at which they invited IEC Immediate Past President Jacques Régis to speak.

The event was opened by Victor Ballivián, President of the Chilean NC,



IEC-ACCSQ representatives at ACCSQ meeting in Cambodia



Latin American Energy Symposium in Mexico

and Jack Nahmías, interim CEO of SEC (Superintendencia de Electricidad y Combustibles).

Amaury Santos, Regional Manager, IEC-LARC (IEC Regional Centre for Latin America) made a presentation on the IEC CA Systems in general and gave an update on IECEx and IECQ activities and achievements. Osvaldo Petroni,

a former Secretary and today Vice-President of the Argentinean NC, talked about the Argentinean experience in IECEE and the benefits Argentinean laboratories and NSBs have gained.

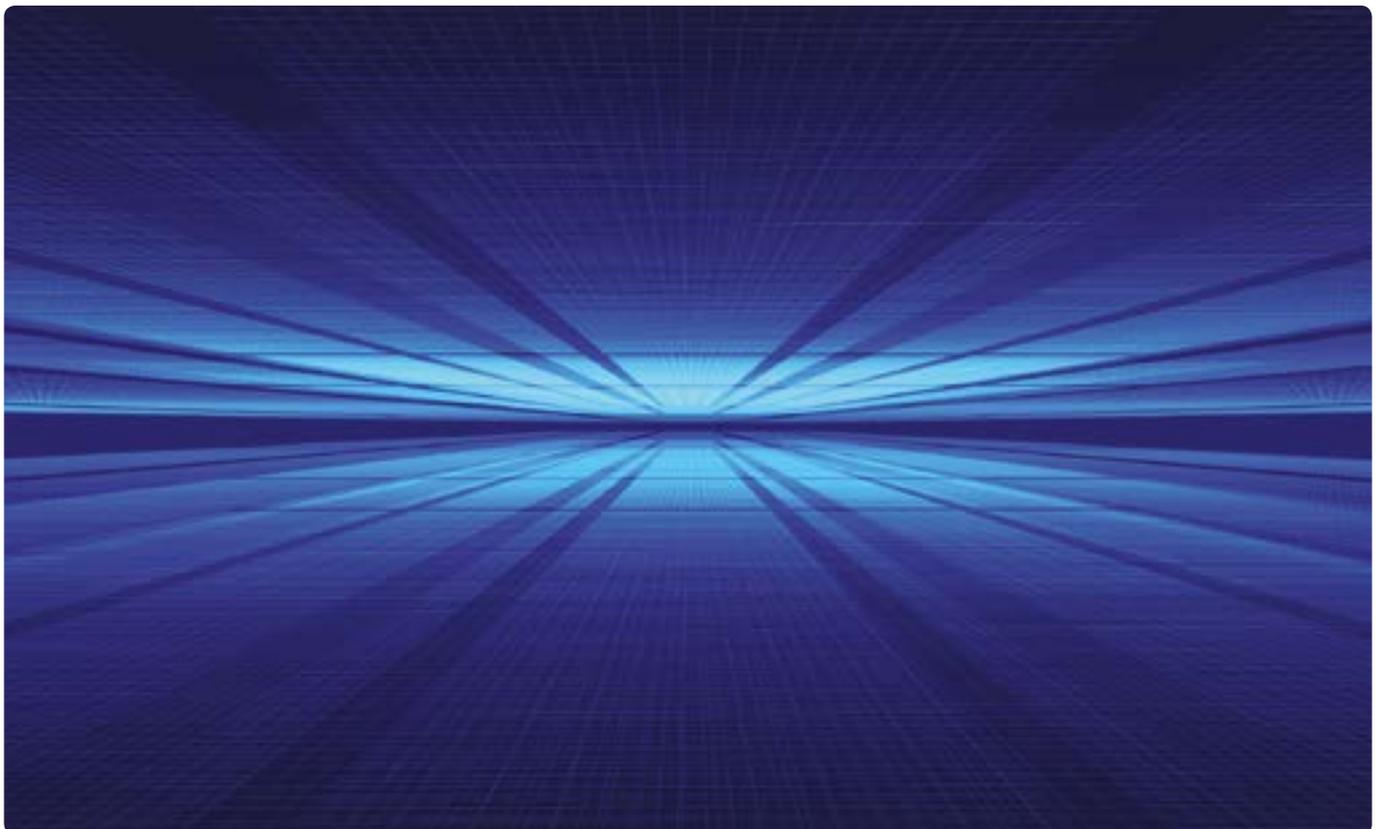
Energy symposium in Mexico

Santos represented the IEC at the opening ceremony of the 6th Latin

American Energy Symposium in Mexico City in August 2011, held in the presence of Mexican authorities and industry leaders. Organized by CANAME, the Mexican National Chamber of the Electrical Industry, and ANCE, the Mexican Standardization and Certification Association, the event offered an exhibition and a series of technical panels addressing issues such as energy efficiency, electrical installations, power generation and distribution, renewable energies, Smart Grid, to name but a few.

Santos made a presentation in the panel on Latin America Electrical Market Evolution, chaired by Rafael Nava, Executive President of ANCE. The focus of his intervention was the increasing participation of Latin American countries in the IEC.

The symposium was a great opportunity for participants from the Latin American energy sector to share experiences and best practices.



Driving discussions

Tangible IEC contributions help EVs move forward

This has been an active and successful year for the IEC in the EV (Electric Vehicle) arena.

Stimulating communication

The year started with a high-level strategic round table that was organized by the IEC jointly with e8, a global organization of 10 world-leading electricity companies, in January in Washington DC, US (United States). The event brought together major stakeholders – automotive manufacturers, electric equipment suppliers and utilities – who need to collaborate to accelerate the global roll-out of EVs. The objective was to stimulate communication amongst the different parties, identify needs and formulate expectations. Unlike traditional vehicles, EVs will depend on, and need to become part of, a huge energy system that involves low-emission electricity generation delivered through progressively smarter grids.

High-level representatives of major car manufacturers, including BMW, Ford, Mitsubishi, Nissan, Renault and Toyota, and equipment manufacturers such as Eaton, General Electric, Hubbell and Schneider, sat together with utilities such as AEP, Duke, EDF, Electrobras, Hydro Quebec, Kansai Electric Power, State Grid Corporation of China and TEPCO. These organizations were joined by EPRI (Electric Power Research Institute) as well as ISO (International Organization for Standardization). All participants underlined their preference for using IEC, ISO and ITU international standards. A second round table is planned towards the end of 2011.

EVs and the Smart Grid

In February, IEC Vice-President Enno Liess gave the opening speech

at the 6th Fully Networked Car workshop organized by WSC (World Standards Cooperation) at the Geneva International Motor Show. He emphasized the importance of International Standards in building Smart Grids that are able to integrate renewable sources of energy and enable the mass charging of EVs to take place. Hans-Georg Frischkorn, Director for Technology and Environment, VDA (Verband der Automobilindustrie) echoed Liess's statements, underlining that the successful roll-out of EVs is dependent on the modernization of electricity grid infrastructure and global standardization of connectors and plugs.

Supporting EV roll-out

In June, several IEC representatives participated in the e8 UN (United Nations) Global Summit on Strengthening Public-Private Partnerships to Accelerate Global Electricity Technology Deployment which took place at UN headquarters in New York. With regard to combating climate change and achieving the UN's Millennium Development Goals,

UN Secretary-General Ban Ki-moon noted: "Addressing these challenges is beyond the reach of governments alone. It will take the active engagement of all sectors of society: the private sector, local communities, and civil society, international organizations, and the world of academia and research".

At the Summit, the IEC and the Global Sustainable Electricity Partnership (formerly e8) issued a joint statement, confirming their commitment to work with the automotive industry and international associations in creating the optimum conditions for the successful roll out of EVs and driving forward efforts to mitigate the effects of climate change.

Two EV charging and infrastructure IEC International Standards

With two globally relevant International Standards for EV charging and its infrastructure undergoing a final vote before their expected publication in mid-October, the IEC will have provided another milestone for the successful roll-out of EVs.



International Standards will help recharging EVs from the mains

Share your work

We want your stories

Nearly 10 000 experts work in the IEC. Often each of them is only aware of the activities of the particular TC/SC in which they work. One of the goals of *e-tech*, the IEC's monthly publication, is to change that. In 2012, the *e-tech* editorial team will be reaching out to TCs/SCs to get their stories.

You participate in the IEC as an expert on a particular topic. At the same time, you and your family members and friends pursue hobbies, consume products and use devices and systems that have been standardized by your colleagues in the IEC without your necessarily knowing about it. We want to bring the work of the IEC, and its relevance to your everyday life, closer to you.

Today, *e-tech* reaches more than 18 000 readers around the world. Each month the IEC publication covers a different topic that describes the work of a variety of TCs/SCs (Technical Committees and Subcommittees). Articles are written so as to be of interest

and accessible to a wide-ranging audience of professionals. The aim is to increase the awareness of IEC work – your work – both within and outside the organization.

In 2012 we plan to increase this sharing and get your input on TCs/SCs as well as including articles that are of direct relevance to your area of expertise.

As a first step in this direction, we're sharing our editorial plan for the coming months of *e-tech*. We look forward to receiving your comments, news and suggestions.

e-tech focus for 2012

January/February: Multimedia and appliances

Audio, video, radio, TV, monitors, printers and all related topics

March: Sensors and safety

All forms of sensors
Functional safety, surge and electric shock protection, enclosures, access control, use of hazardous substances

April: Transportation

Ships (also ports), public transportation (trains, metro, buses, cable cars, automobiles, including EVs), batteries, displays and other components

May: Storage and communication

Data storage and cloud computing
Energy storage such as batteries, fuel cells, molten salt (turbines), fly-wheels, pumped storage. Communication between devices in homes, offices, industrial environments, including manufacturing, wireless and wired, protocols and devices

June: Home and entertainment

Tools for DIY (do-it-yourself) and garden, pool heaters and lighting, barbecues, amusement parks, extension cords

July: Cooling, heating

Furnaces, freezers, air-conditioners, water heaters, microwaves, welding, soldering, brazing

September: Connectors and interrupters + World Standards Day

Plugs, sockets, switches, relays, fuses, insulators, surge arresters, enclosures, capacitors, resistors

October: Oslo IEC General Meeting review of the past year + lighting and LED

November: Power generation and transmission

Smart Grid, renewables, nuclear, HVDC, LVDC

November (mid): Special GM

December: Robots and toys

Medical, industrial, automation, Ex(plosive environments), robots
Electric and electronic toys.



Young Professionals' Programme

2011 General Meeting session in preparation

As each IEC National Committee has gone through a national selection process and named its 2011 IEC Young Professionals, the profiles of those selected have appeared in the [password protected] Resource Area on the IEC website. Now the results of a recent survey of last year's Young Professionals have been published. They are both revealing and encouraging.

Seattle – the beginning

Last year's GM (General Meeting) in Seattle saw the start of a new initiative by the IEC to involve younger professionals more deeply in the world of standardization from the very outset of their career. Labelled the Young Professionals' Programme, it brought together the representatives chosen by the various IEC NCs around the world. During the IEC GM, young professionals were given the opportunity of establishing contact with their peers and with IEC Officers and technical experts, and also of experiencing IEC technical and management meetings. The event was such a success that a repeat event is being held during the 2011 IEC GM in Melbourne, Australia.

Melbourne – continuing momentum

The IEC YPs (Young Professionals) are technical, managerial and engineering

professionals in their twenties and mid-thirties. They are already familiar with the world of international standardization and CA (Conformity Assessment), either because they develop standards or because their work is closely linked to them.

Experiencing the world of standardization from the inside

This year's workshop again takes place over three days. After an evening reception to welcome them at the start of the workshop, sessions begin the following day with detailed explanations of the world of IEC International Standards and Conformity Assessment.

YPs get to hear about the personal experiences of the 2010 Young Professional Leaders and about the Programme itself. They learn what to expect when attending an IEC technical meeting, are given a detailed explanation of the IEC structure and its membership, and have time to ask questions and obtain additional information. After lunch with SMB (Standardization Management Board) members, they sit in as observers at the SMB meeting before splitting into smaller groups for a special breakout session.

The following day, attendees resume with sessions specially designed to give them a deeper understanding of technical meetings and the notions of CA.



They attend a technical meeting and then the CAB (Conformity Assessment Board) meeting as observers, following which, lunchtime provides them with an opportunity to meet and discuss with the CAB members. Attendees then separate again into smaller groups for another breakout period. A further session deals with how to become more involved in matters of standardization.

Challenges in applying standardization

The final day starts with interactive sessions and deals with topics such as multimedia, explosive atmospheres,



Young Professionals exchanging views





the Smart Grid and some of the IEC IT (information technology) tools developed specifically to help IEC experts around the world carry out their standardization tasks and communicate with each other.

Statistics concerning the 2010 programme

Fifty-three participants (89 % of whom were men) from 27 IEC Full Member countries all over the world took part in the 2010 YP Programme. 28 % were from industry and 15 % from academic institutions. The remainder was divided between testing and certification bodies, and utilities (each with 13 %), a further 10 % were from government institutions,

and the remainder came from the private sector and R&D (Research and Development) institutions. Europe, Asia and the Americas were the most broadly represented (respectively 39 %, 32 % and 19 %), with Africa and Oceania also present.

Encouraging results of the 2010 Young Professionals' Programme survey

The results of the survey were encouraging. 62 % of the respondents indicated that their participation in standardization and/or CA work had increased as a result of their involvement in the YP Programme. 38 % had experienced a change in the position

they had held previously in their own NC or IEC groups. Several of the participants commented on how they had become active members of IEC TCs (Technical Committees), technical mirror committees or other working groups at a national level, and had been provided with additional opportunities to attend technical meetings.

As a result of increased awareness and understanding of international standardization work, and the networking opportunities the Programme provided, most had become more involved at a professional level within their own companies and were able to share what they had learnt with their colleagues.

Objective of the Programme reached

The results of the survey show that the 2010 Young Professionals Programme has, to a very large extent achieved its objective, which is to encourage the younger generation of experts, managers and leaders to become more deeply involved in standardization work and CA activities. Of the 96 % of the 2010 participants who planned to become more involved in IEC work, the majority did just that in 2011.

Creating further awareness at a national level

Now, with the help of the Programme Leaders, who are coordinating work on a YP manual for future participants, the aim is to spread the message further and encourage NCs to set up equivalent programmes at a national level. Involving more people at the national level is yet another means of increasing awareness of standardization and involving more young professionals throughout the world at an early point in their career.

Safe batteries

Harmonization of safety requirements for batteries is underway

Batteries are used in numerous devices and their safety determines the lifespan and faultless operation of countless products. With converging technologies and the advent of horizontal standards comes the need to regularly review, compare and update the standards that define safety requirements in order to ensure that testing and conformity assessment processes are coordinated. This is what is currently happening for the standards issued by IEC TC 108 and IEC SC 21A.

Coordinated test requirements

There are currently four IEC International Standards involved in this harmonization process.

Three of these standards are developed by IEC TC 108, which has responsibility for the safety of electronic equipment within the field of audio/video, information technology, and communication technology:

- IEC 60065, *Audio, video and similar electronic apparatus - Safety requirements*
- IEC 60950-1, *Information technology equipment - Safety - Part 1: General requirements*
- IEC 62368-1, *Audio/video, information and communication technology equipment - Part 1: Safety requirements*

The fourth standard is issued by IEC SC 21A, which has responsibility for secondary cells and batteries containing alkaline or other non-acid electrolytes:

- IEC 62133, *Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries*

made from them, for use in portable applications

While both IEC 60065 and IEC 60950-1 provide normative lists of component standards for use when testing and evaluating end products, there is no mention of IEC 62133 in the current editions of these two standards. As a consequence, end products that come within the scope of IEC TC 108 cannot be tested against the requirements specified by IEC 62133.

Both committees have established a formal liaison relationship and work closely together in a joint working group to update and develop meaningful, value-added, and coordinated safety requirements to the appropriate standards for cells, packs and end products. They are currently jointly revising and preparing new editions of the above-mentioned three standards.

Revisions underway

The revised IEC 62133 is currently at the CDV (Committee Draft for Vote) stage. The document (21A/481/CDV) has received strong support from the



IEC TC 108 is working closely with SC 21A to harmonize the safety of batteries

P-members (Participating members), with 16 voting in favour and one abstaining. As a result, SC 21A will soon issue an FDIS (Final Draft International Standard) for the next edition of IEC 62133, which is expected to be published in the first quarter of 2012.

TC 108 is in the process of developing the next editions of IEC 60065, 60950-1 and 62368-1 and has recently issued CD (Committee Draft) 108/455/CD. Annex M of the CD deals with batteries and was prepared taking into account



Laptop batteries are to be harmonized in the next editions published by TC 108 and SC 21A



IEC TC 108 and SC 21A are also working together to harmonize safety requirements for rechargeable batteries

the comments received on a previous CD containing similar requirements. Comments received on 108/455/CD will be reviewed at a meeting in October 2011, with the anticipation that

a CDV will result from that meeting. While 108/455/CD is specifically targeted for the second edition of IEC 62368-1, TC 108 has agreed to include the same technical content regarding batteries in the next editions of IEC 60065 and 60950-1.

Enabling testing

As a result of the above, it is anticipated that the next editions of IEC 60065, 60950-1, and 62368-1 will contain normative references to IEC 62133, as well as other battery standards, as appropriate.

A safe and practical decision

Since manufacturers continue to produce batteries for high-tech products covered by IEC TC 108, and testing laboratories need to provide assessments of their

safety, the IECEE CMC (Certification Management Committee) made the practical decision, at its 2010 annual meeting, to exempt batteries used in high-tech products from the need to comply with IEC 62133, until new editions of the standards are published. Reviewing the situation at its 2011 meeting and responding to a request from TC 108, the CMC agreed to continue with this exemption. This has no impact on the safety of those batteries, as they still need to comply with the standards issued by TC 108.

It is anticipated that batteries that are in compliance with the next edition of IEC 62133 will also be required to comply with the next editions of the three TC 108 standards mentioned above.

Moving forward

IECEE developments to meet industry demands

IECEE, the IEC System of Conformity Testing and Certification for Electrotechnical Equipment and Components, is a truly international conformity assessment system. The IECEE CB Scheme opens up access to the global market, while the IECEE CB-FCS (Full Certification Scheme) takes testing and certification a step further with a complete factory inspection process. IECEE is also the exclusive provider of the PV (photovoltaic) Quality Seal and Quality Mark. Technological innovations and environmental issues have prompted the setting up of additional services to meet specific demands from industry and governments worldwide.

One test, one certificate opening many doors

Products tested and certified in one country will be accepted in all other IECEE member

countries. But it doesn't stop there. Global acceptance of the CB Scheme through the CB Test Certificates and associated CB Test Report is also effective in countries that are not part of the IECEE community. A CB Test Certificate is a global passport for the product.

The IECEE CB Scheme provides assurance that tested and certified products meet the strictest levels of safety, reliability and performance as per the requirements of the relevant IEC International Standards. It helps reduce costs and time to market, eliminates duplicate or multiple testing and offers a high level of confidence for manufacturers, retailers and consumers alike.

Factory inspection – global proof of consistent quality

The CB-FCS Scheme for Mutual Recognition of Conformity Assessment Certificates for Electrotechnical Equipment

and Components is an extension of the IECEE CB Scheme that also includes factory surveillance.

This scheme goes beyond product testing. It covers Type Test and regular surveillance at the factory that manufactures the relevant certified product. This is of value to manufacturers who need to provide proof



that products manufactured in a given factory offer a consistent level of quality over time.

With CB-FCS, the manufacturer can complete all certification and factory surveillance steps in the country in which the factory operates. They include product sampling, testing, assessment and surveillance of assembly lines and management processes, surveillance and regular sampling and retesting of products both at the factory and/or in the market place.

CB-FCS provides proof that each product from a certified factory offers consistent levels of quality and safety. All members participating in CB-FCS mutually recognize the CA (Conformity Assessment) Certificates and associated CA Reports, including Factory Surveillance Reports, as the basis for national approval or certification. In many cases they will be sufficient for direct acceptance by the market. CB-FCS also helps reduce trade barriers caused by the application of different national certification criteria and speeds up certification and market access.

Factory Surveillance Reports can also be used as stand-alone proof of compliance of the factory where the product is manufactured and/or assembled whenever the national authorities and/or retailers, buyers and vendors require such a report.



IECEE is the exclusive provider of the IECEE Quality Seal and Mark for PV products

Exclusivity of PV Quality Seal and Mark

The PV Quality Seal and Quality Mark are the internationally recognized quality benchmarks for PV products and the worldwide reference model for manufacturers of PV products and systems, as well as for suppliers of components used in PV products. They ensure that solar equipment and components are compliant with IEC International Standards in terms of safety and performance. The PV quality system is exclusive to the IECEE. PV Certificates are issued by an approved IECEE NCB (National Certification Body).

The World Bank recognizes the PV Quality Mark and recommends that it be included in every tender.

Australian regulation for PV modules

In Australia, PV modules sold and installed in the country must be tested and certified



IECEE is developing new services, one of them is for electric cars

to the relevant IEC International Standards by a laboratory accepted by the IECEE System. The first Clean Energy Council of Australia regulation was enforced in June 2009. It was complemented in March 2011 by an even stricter clause stating that certificates will be accepted only where periodic factory inspections are carried out by the NCB to ensure ongoing compliance with International Standards. Similarly, imported PV modules must be approved for use in Australia. NCBs and test laboratories must be on the IECEE list posted on the CEC website.

New services in the pipeline

IECEE is developing new services to respond to demand from industry: industrial automation and automation devices, Smart Grid – with focus on the smart home, the smart building and the smart factory – electric vehicles and energy efficiency.

How the IECEE works

Over 75 NCBs now participate in the IECEE System. More than 366 independent CBTLs (Test Laboratories) and more than 2 000 MTLs (Manufacturers' Testing Laboratories) test millions of electrical and electronic products and components, which are commuted into IECEE CB Test Certificates by the IECEE NCBs.

Any NCB and testing laboratory can seek IECEE membership. However, prior to their Registration as IECEE NCB and CBTL, they must comply with the strict rules and procedures of the IECEE System and successfully pass the IECEE peer evaluation based on ISO/IEC Guide 65 and ISO/IEC 17025 and specific IECEE procedures.

Examples of products tested include: household appliances, batteries, cables

and cords, household equipment, luminaires, office and IT (information technology) equipment, electrical equipment for medical use, electric toys, portable tools, electronics and home entertainment and photovoltaic components, products and systems. The IECEE also covers switches for appliances, transformers, fuse boards, tests for electromagnetic compatibility, hazardous substances, electrical vehicles chargers, and stations and much more.

Taming the Ex factor

Kerry McManama plays major role in IECEx development and growth

The following article is based on an interview with IECEx Chairman Kerry McManama

Oil and gas refining, chemical processing, coal mining, paper and textile manufacturing, grain handling and storage, sugar refining. These are very different industrial sectors that have one thing in common. They all have hazardous areas in which flammable liquids, vapours, gases or combustible dusts present a fire or explosion hazard. The use of on-site electrical equipment just adds another spark to this dangerous mix. IECEx, the IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres, is globally recognized as helping companies tame hazards in Ex (explosive) areas.

Kerry McManama

IECEx Chairman Kerry McManama, a US citizen, has been involved in IECEx almost since its inception. He has seen it grow and expand and has participated actively in its development and management. He joined UL (Underwriters Laboratories) in 1992 and three years later was offered a position in UL's Hazardous Locations Services. Certification in the Ex sector was in full expansion at that time and McManama played a major role, first in the UL services and then in contributing to the development of IECEx, which was created in 1996.

Getting involved internationally

McManama's involvement with IECEx began in 1998 when he attended the IECEx annual meeting in Paris, France, as an observer. Upon his return to the USA, he helped set up the US Member Body of the IECEx, and served as its Chairman for two terms.



Kerry McManama, Chairman, IECEx

McManama subsequently became Chairman of IECEx ExTAG (Test and Assessment Group) for one and a half terms before being elected Chairman of IECEx. He is now nearing the completion of his first term as Chairman and was reelected for a second term at the 2011 IECEx annual meeting in Split, Croatia in early September. The election is expected to be approved by IEC CAB (Conformity Assessment Board) during the IEC General Meeting in Melbourne in October 2011.

IECEx rapid expansion...

In 15 years, the IECEx System has grown tremendously, becoming the first truly international certification system for the Ex sector. In the early days, the system focused exclusively on product testing and certification through the IECEx Certified Equipment Scheme. It established its expertise, expanded membership, increased the number of approved ExCBs (Ex Certification Bodies) and ExTLs (Ex Testing Laboratories) and developed a solid customer base. More and more, manufacturers of Ex equipment have come to rely on IECEx for the certification of their products.

...and diversification

The key word for the first decade of the 21st century is diversification. Several new services have been put in place to respond to strong industry demands. As part of the IECEx team, McManama has been involved in all these developments.

The IECEx Certified Service Facilities Scheme was introduced in 2007,



From left: Hironmichi Fujisawa, Chairman, IEC CAB, Chris Agius, IECEx Executive Secretary, Lorenza Jachia, Secretary of the UNECE Working Party on Regulatory Cooperation and Standardization Policies, and Kerry McManama in front of the United Nations in Geneva, Switzerland

followed by the IECEx Conformity Mark Licensing System in 2008. Early in 2010, IECEx launched the IECEx Certificate of Personnel Competence Scheme for individuals working in the Ex sector.

Teamwork is all

Teamwork is the key. All efforts put in by McManama, together with IECEx Executive Secretary Chris Agius and the IECEx Officers and Executive team, are bearing fruit. They participate in a great number of conferences and events all year round to promote the System and to inform and educate stakeholders and customers.

United Nations endorsement

At the end of 2009, the United Nations, through the UNECE (UN Economic Commission for Europe), formally endorsed the use of an internationally recognized certification system, IECEx,



IECEx certifies the competence of individuals working in Ex areas such as oil rigs

to promote safety of equipment in explosive areas. Early in 2011, UNECE issued a publication, *A Common Regulatory Framework for Equipment Used in Environments with an Explosive Atmosphere*, which helps outline the

hazards in environments with a high risk of explosion such as mines, refineries, chemical plants and mills. The UN publication cites IEC International Standards and IECEx as the references in standardization and conformity

About the IECEx Schemes

IECEx Certified Equipment Scheme

An IECEx Certificate is like a passport for manufacturers of Ex equipment. It provides clear proof of claimed compliance with International Standards. It certifies that the equipment in question has the right level of protection and gives products access to foreign markets without the burden of repeat testing. It provides assurance that products bearing an IECEx Certificate conform to the International Standards listed on the same Certificate, and are under a product surveillance programme to ensure continued compliance with the Standard.

IECEx Certified Service Facilities Scheme Equipment and machinery used by companies operating in hazardous areas have a much higher capital cost than the same equipment used elsewhere. Once purchased and installed, the equipment has to last many years. This is why repairing the equipment is more cost-effective than

replacing it. There are also compatibility issues relating to replacement. In response, the Ex repair industry has emerged, along with IEC 60079-19, *Explosive atmospheres - Part 19: Equipment repair, overhaul and reclamation*. The questions for industry have been:

“How can I be confident that an Ex Repair Workshop has:

- The required repair facilities, specified in IEC 60079-19?
- The required systems in place?
- The required skilled personnel?”

Industry has turned to IECEx for a solution: the IECEx Certified Service Facility Scheme. It assesses and certifies that the organizations and workshops which provide repair and overhaul services to the Ex industry do so respecting the strict requirements of IEC 60079-19.

IECEx Certification of Personnel Competence Scheme

While the assessment and certification of Ex equipment and the servicing of that

equipment were covered, one final piece was still missing: the assessment and certification of competence of those who work in the Ex sector. Early in 2010, IECEx launched the new CoPC (IECEx Certificate of Personnel Competence Scheme), which provides companies with independent proof that a person has the qualifications and experience necessary to implement the International Ex Standards. This can be especially important for contract staff.

To obtain a CoPC, a person prepares an application and submits it to an approved IECEx Certification Body. Regular re-assessment also ensures that the certified person maintains these competencies. The certificate is personal, non-transmittable and valid across international borders.

IECEx Conformity Mark Licensing System IECEx has also established the IECEx Conformity Mark Licensing System. The ExMark provides immediate evidence that products bearing the mark are covered by an IECEx Certificate of Conformity.

- ▶ assessment in the Ex field: without certification, state-of-the-art equipment will remain unavailable. This implies lower than optimum levels of safety both for local industry and for the populations that live around the sites that harbour potential explosion risks.

Major conference in Dubai

The founding members of IECEX were almost exclusively countries in which Ex equipment manufacturing industry was well established. Other countries and regions – the Middle East for example – where a huge number of oil production and processing facilities

are located, started to show a growing interest in IECEX when the System started to offer new services such as the certification of repair and overhaul facilities or of personnel competences.

To help industries in that region get better acquainted with standardization and conformity assessment and find out how they can best benefit from IECEX services, the IEC and IECEX, together with ESMA (Emirates Authority for Standardization and Metrology), and in conjunction with UNECE, are organizing the 2012 IECEX International Conference

in Dubai, United Arab Emirates, on 20-21 March 2012 (see separate article on the event in this issue of *e-tech*).

Reaching out

This year's Workshop for Industrializing Countries, held during the IEC General Meeting in Melbourne, is another opportunity for McManama and other IECEX experts to reach out to new countries. The workshop will focus on the IECEX Certification of Personnel Competence Scheme and will be open to both IEC members and Affiliates.

Dubai to host major IECEX event

First IECEX International Conference in the Middle East



Middle Eastern countries that have a large number of oil producing and processing operations are expressing a strong interest in IECEX, the IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres. To

help educate interested parties about the System and learn how the region can benefit from it, ESMA (Emirates Authority for Standardization & Metrology) has taken the initiative and approached IECEX to host a major event in Dubai, United Arab Emirates.

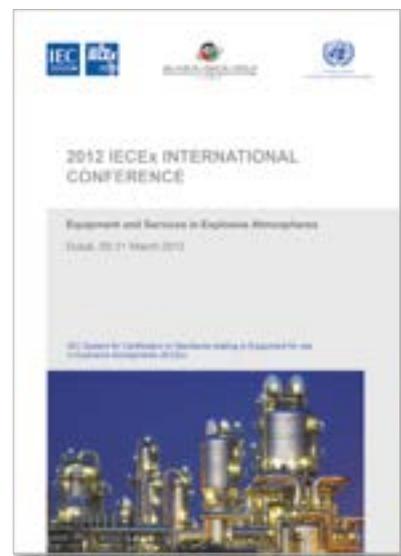
The conference

Organized by the IEC and IECEX, together with ESMA, and in conjunction with UNECE (United Nations Economic Commission for Europe), the 2012 IECEX International Conference will take place in Dubai on 20-21 March 2012.

The two-day event will provide a unique opportunity for industries in the region to get better acquainted with IEC International Standards and Conformity Assessment Systems in general and find out how they can derive most benefit from the IECEX services that cover Ex equipment and systems, repair and overhaul facilities, and certification of personnel competence. All services are formally endorsed by the United Nations, through UNECE, as an international model for safety regulations in Ex (explosive) areas.

A world of expertise

This conference will bring together experts from all over the world who are involved in the design, manufacturing, inspection, repair and overhaul of Ex equipment and systems, as well as in the assessment and certification of personnel competence. Issues concerning requirements and regulations in the GCC (Gulf



Cooperation Council) region will form a crucial part of the conference.

Through their presentations and direct contact, the expert panel of speakers will be able to share their experience and detailed knowledge of all matters pertaining to the Ex field, such as plant design, principles and practical applications of area classification, installation and repair in compliance with IEC International Standards. They will answer questions, provide advice and give valuable information to anyone involved in the Ex sector.

It is worth noting that a great number of experts have already offered to speak at this event.

Networking opportunity

In addition to the exchange of valuable and updated information concerning Ex equipment and installations, this event provides an excellent networking opportunity for key managers and personnel associated with the day-to-day operation of Ex related plants and installations, especially within the oil and gas industries.

Get involved – Participate

If you take part, you will be able to benefit from the experience of a great number of experts who have offered to make presentations.

Practical information

Interest in this event has been very strong from the outset. If you want

to get involved, send your information to info@iecex.com

This is a sponsored event – Admission to the conference is free.

The conference will be held at the Dubai Grand Hyatt Hotel on 20-21 March 2012

A copy of the conference brochure and detailed programme is available at: www.iec.ch/meetings/events

For more information on IECEx: www.iecex.com

Safety inside

IECQ certification ensures reliability and consistency in electronics

Electronic components. We don't see them. Most of us don't even know what they look like. But we cannot do without them. Homes, offices, factories and transportation systems all rely heavily on them. Mobile telephones, computers, car and aircraft navigation systems, and automated production chains wouldn't exist without them.

IECQ certification saves time and costs

Because electrical and electronic products contain many, sometimes hundreds of, individual components and sub-assemblies, manufacturers want to be assured that the electronic components used in their products are of the required quality and reliability. To minimize incoming inspection costs and eliminate the need to carry out a quality audit on parts, they can choose suppliers who hold product approvals for their components.

IECQ, the IEC Quality Assessment System for Electronic Components,

provides certification at the international level for a wide variety of electronic components. At present, there are eight families of components covered by IECQ:

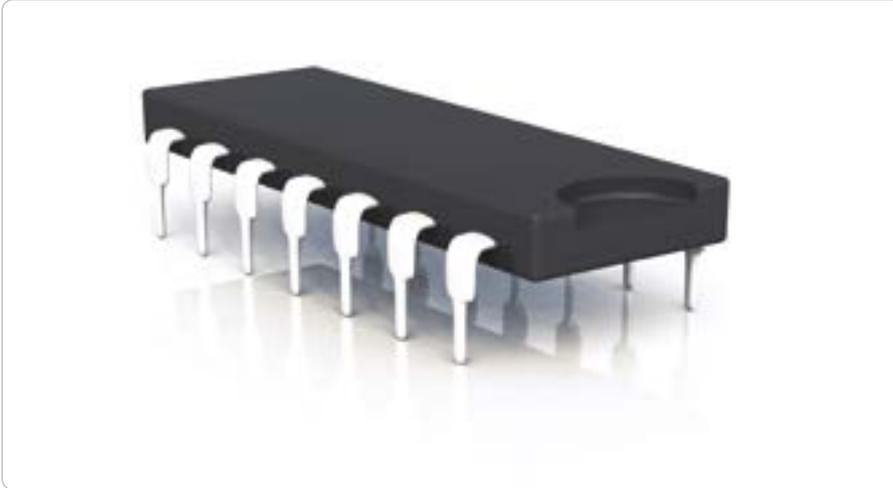
- active components, including integrated circuits
- electromagnetic components
- electromechanical components

- electro-optic components
- hybrid integrated circuits
- passive components
- printed boards
- wires and cables

Then there are the processes and related materials that make up the electronic



IECQ ECMP provides aircraft manufacturers with a global assessment and certification covering their electronic component suppliers



IECQ HSPM helps electronic component suppliers prove that their products comply with requirements



Electrostatic discharge (ESD) can cause permanent damage to electronic equipment

components and assemblies. But there is more to electronics than just the testing and certifying of components. IECQ is continuously expanding to address industry's needs: hazardous substances and avionics for example, or more recently ESD (electrostatic discharge).

ESD compliance

IEC 61340-5-1, Electrostatics Part 5-1: *Protection of electronic devices from electrostatic phenomena – General requirements*, covers requirements for the design, implementation and maintenance of an ESD control programme for activities that manufacture, process, assemble, install, package, label, service, test, inspect, transport or otherwise handle electrical or electronic parts, assemblies

and equipment susceptible to damage by electrostatic discharges greater than or equal to 100 V HBM (human body model). Under the IECQ Process Approvals Scheme, companies and organizations may apply to IECQ-approved Certification Bodies for assessment to IEC 61340-5-1 along with IECQ Scheme requirements.

Compliance with legislations made easy

Concern for the environment and the need to eliminate hazardous waste prompted IECQ to devise a new scheme to help electronic component suppliers prove that their products comply with requirements to be free of hazardous substances. That was in 2005. Since then, the IECQ HSPM (Hazardous Substances

Process Management) has grown tremendously.

Many countries have passed legislation restricting or forbidding the use of hazardous substances in electronic components. In the European Union, the RoHS (Restrictions of Hazardous Substances) in electrical and electronic equipment and WEEE (Waste Electrical and Electronic Equipment) Directives took effect in July 2006 and are currently being revised.

Through IECQ HSPM certification, electronic component manufacturers and suppliers can demonstrate that their electrical and electronic components and assemblies meet hazardous-substance-free specific local, national and international requirements. IECQ HSPM certificates have gained tremendous recognition in recent years and continue to do so, thus helping to reduce costs and time to market and eliminating the need for multiple testing.

Long-term supply control

The avionics industry is increasingly dependent on COTS (commercial off-the-shelf) electronic components. These are principally mainstream products, designed and manufactured not just for aerospace but for a wide variety of industries. But the sector has to meet its own requirements in terms of performance and durability.

The avionics industry also has to face a new threat in the form of counterfeit electronic components. Counterfeit prevention is essential for avionics applications, where reliability and safety requirements are of the utmost importance.

The IECQ ECMP (Electronic Component Management Plan) provides aircraft manufacturers with a global assessment and certification covering their suppliers. In future, IECQ is planning to use this Scheme in other high-reliability sectors such as railway and automotive industries.

The IECQ website – www.iecq.org – provides detailed information of each of its schemes.

2011 Awards

Commitment to the IEC

Every year the IEC honours the commitment and work of a select number of individuals who, through their leadership and technical expertise, have contributed to making products and electrical systems safer, more energy efficient and more compatible. This in a world that increasingly is looking to reduce consumption and emissions and improve interoperability.



The Lord Kelvin Award is the IEC's highest tribute. In 2011, it has been granted to just one individual

Lord Kelvin Award – IEC's highest distinction

Created and first awarded in 1995, the IEC Lord Kelvin Award is named after the IEC's distinguished first President, William Thompson, Lord Kelvin. It is the IEC's highest tribute and is awarded primarily in recognition of the long-term technical contributions outstanding individuals have made to the Commission.

Nominations for the Lord Kelvin Award can be made by IEC NCs (National Committees), TC (Technical Committee) and SC (Subcommittee) Chairmen, and members of CB (Council Board), SMB (Standardization Management Board) and CAB (Conformity Assessment Board).

They submit their proposals based on their recognition of contributions made over time, irrespective of the nationality or technical area of the nominee.

Thirty-one laureates have to date been honoured with the IEC's highest accolade. To qualify, candidates must still be active in the IEC and have contributed significantly to the IEC's work over many years, particularly through their leadership and technical contributions to international electrotechnical standardization, CA (Conformity Assessment) and related activities. The Award recognizes the major role that a person has played to the extent that their contribution has considerably benefited industry or commerce, or promoted the IEC's image in the business world.

Richard Schomberg to receive the 2011 Lord Kelvin Award

One candidate, the Frenchman Richard Schomberg, was subsequently supported by the CB. There will be a special ceremony organized for him during the Dinner for Presidents, Chairmen and Secretaries at the IEC General Meeting in Melbourne. He is to receive his gold medal, golden pin and certificate from the IEC President, Klaus Wucherer, in the



Richard Schomberg

presence of a great number of his peers and colleagues.

An expert in the field of electrical power distribution, Richard Schomberg is Group Vice-President Smart Energy Standards at EDF (Electricité de France) where he designs and negotiates strategic innovation partnerships primarily with the Electric Power Research Institute (Palo Alto), National Laboratories, Universities and scientific/technical innovators.

Schomberg was a pioneer in setting up and chairing the SMB's SG (Strategic Group) 3 on Smart Grid. He has been a key spokesman at many international events where he never ceases to explain the IEC's role in seeking consensus-based solutions to the energy challenge. He chairs IEC TC 8: Systems aspects of electrical energy supply; is Convener of the Chairman's Advisory Group and the ad hoc group on Smart Grid Requirements within TC 8; and is a past Chairman of TC 45: Nuclear Instrumentation.

In SG3, he has succeeded in blending together technology maps, scenarios and use-cases, and in coordinating multiple TCs and NCs as well as other groups and technology organizations working in the smart grid area. He has reached out to many consortia, trade groups and smart grid initiatives around the world using his knowledge and experience to further work in this vital area.

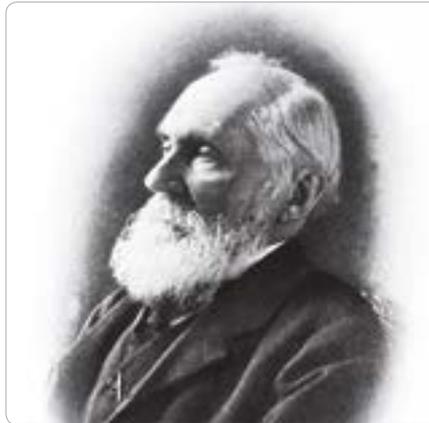
2011 Thomas A. Edison Award Laureates

The Thomas A. Edison Award was awarded for the first time in 2010. It recognizes exceptional achievement in committee management by either current TC and SC Officers or their CA counterparts. The Award can be given to a maximum of nine people in one year.

In 2011, the following distinguished people will receive their award during the IEC General Meeting in Melbourne: Anne Bosma, Secretary of TC 17 and SC 17A; Wim De Kesel, Secretary TC 23; Ken-ichi Sato, Secretary TC 90; Lev Travin, Secretary SC 22F. Wolfgang Kreinberg, Senior Consultant International Affairs, TÜV SÜD Product Service, who is unable to be present in Melbourne, will receive his award at a later date.

1906 Award

The 1906 award was established in commemoration of the foundation of the



William Thomson, Lord Kelvin, a Belfast-born mathematical physicist and engineer, became the first president of the IEC in 1906

IEC and honours technical experts around the world whose work is fundamental to the IEC. Each year a maximum of five awards may be granted per TC, including its various subcommittees.

A total of 124 experts from 46 TCs – including ISO/IEC JTC (Joint Technical Committee) 1 and IECEE – and 21 NCs were nominated to receive this year’s 1906 Award. It recognizes exceptional recent achievements related to the activities of the IEC that contribute in a significant way to advancing the work of the Commission.

Alpha and omega

Before the spreading of the word

One of the IEC’s less visible forces is the Editing and Document Preparation team. This nevertheless plays a vital role in producing the IEC International Standards that are used by companies throughout the world as the basis for their product designs and subsequent Conformity Assessment. Since the last e-tech report on its activities, the role of the Technical Editing team, as it was previously known, has broadened from technical editing to include layout and figures and electronic publishing; hence the reason for the new name.

that inconsistencies in vocabulary that can slip in during the process of the writing; decimal points that get displaced; formatting and stylesheet use that cease to follow the original layout. When a document passes from a technical expert in one area of the world to another in an

entirely different location, these types of discrepancy are inevitable. It is the role of the IEC’s Editing and Document Preparation Team to ensure that each IEC publication follows the drafting directives and retains linguistic coherence between versions and subsequent

Before an IEC International Standard can be formally voted on and issued, it goes through several cycles of editing and approvals. Each IEC Technical Committee is responsible for the content of its own publications. The process of building consensus is a long one and, while all participating experts are masters of their subject matter, documents have to comply with a strict set of drafting rules (the ISO/IEC Directives, Part 2). Add to



Figures and formula – editing work for the specialist typographer

translations, while remaining clear and unambiguous for its target audience.

EDP – not only electronic data processing, but layout, figures and publishing too

The July 2010 *e-tech* contained an outline of the role of the Editing team, as it was then known. During 2011, the Technical department at IEC Central Office changed quite considerably and various groups were joined together to maximise synergy. In the process, the Editing team became the Editing and Document Preparation team or, to coin a rather fitting acronym, much-used in the context of automation, the EDP. In its other guise, EDP stands for *electronic data processing* and involves tremendous volumes of efficiently-produced information. Seen in the context of the IEC it is a most suitable “homonym”: on average, the team treats some 65 000 pages of documents each year.

During the course of 2011, two editors left, one to go into well-earned retirement, the other to pursue professional challenges closer to home. Together they had acquired some 40 years of technical vocabulary and knowledge. In the case of the IEC’s broad representation of complex electrotechnology, that is not an easily-replaced commodity, and the IEC is lucky to have found two very competent and promising new editors.

Today, the various teams in charge of document layout, figures and editing have been grouped into a single, seamless whole. New international faces have joined the team to work on electronic publishing, figures, graphics and layout and generally to assist TCs (Technical Committees) in the preparation of their documents. Together they’re dealing with some of the challenges encountered with any 21st century document preparation and distribution process. These involve stylesheets and templates; varying external software and hardware configurations; tracking of multiple versions; electronic databases and storage; world-wide distribution needs;



Rather like the Rubik's cube, the EDP team work together seamlessly so that the pieces put together today, don't have to be rethought tomorrow

digital asset management and the formal *ISO/IEC Directives* that need to be applied.

Taking into account new variants on the Rubik's cube

One could liken the Editing and Document Preparation team to a new variant of the Rubik's cube, in which ingenious design ensures that all the pieces fit together perfectly so as to rotate effortlessly around a common axis. The team Manager, Alisdair Menzies, is indeed passionate about the Rubik's cube, of which he has a whole collection in varying experimental shapes and different architectures, designed and manufactured using 3D printing technology – a revolutionary manufacturing approach covered in the August/September edition of *e-tech*.

The publishing world is a fast-changing one and members of Menzies' team are working hard to ensure that the pieces put together today don't have to be rethought tomorrow. In recent times the

team has absorbed a high volume of new material: the quantity of translated publications has risen by 25 %.

TCs will welcome the new resource area set up on the IEC website to cater for their external experts whose part-time job it is to write and submit the information for IEC International Standards. They offer their work because of their passion for the subject, but they're rarely trained in complex word processing techniques and tools for figure acquisition. So, the Editing and Document Preparation team have put together a series of rules and recommendations; tips and tricks and guidance designed to help them in their task.

As the need arises and new requests come in for additional help, they'll be adding to and updating the information in that special section which can be found on <http://www.iec.ch/standardsdev/resources/docpreparation/>.

Nominations

Officers of IEC Consultative Committees

In addition to its TCs (Technical Committees) the IEC has a number of SGs (Strategic Groups) and Advisory Committees that report to the SMB (Standardization Management Board). This month *e-tech* announces two nominations to these committees.

IEC SG 1

IEC SG 1 on Energy efficiency and renewable resources

SG 1 was established by the SMB (Standardization Management Board) in 2007 to look at current developments in energy efficiency and renewable resources, and set out the IEC's standardization work in these areas. Its terms of reference are:

- to analyse the status quo in the field of energy efficiency and renewable energy sources (existing IEC standards, on-going projects)
- to identify "white spots"/gaps/opportunities and find new ways of achieving energy efficiency in the electrotechnical domain
- to set objectives for electrical energy efficiency (EEE) in products and systems

- to formulate recommendations for further action

The SMB has approved the nomination of Atsushi Takakuwa as Japanese member to SMB SG 1, replacing Morihiro Taba.

Takakuwa is a deputy director, Technical Regulations, Standards and Conformity Assessment Policy Division, at METI (Japanese Ministry of Economy, Trade and Industry).

He is in charge of the standardization of strategic areas that include Smart-Grid, Smart-City and energy efficiency.



Digital thermostats help reduce energy use



ACEA acts as an advisor to SMB on environmental matters

ACEA

ACEA (Advisory Committee on Environmental Aspects), which reports to the SMB, considers all aspects of the protection of the natural environment against detrimental impacts from a product, group of products or a system that uses electrotechnology, including electronics and telecommunications. EMC (Electromagnetic Compatibility) aspects are excluded from its remit, as they are covered by ACEC (Advisory Committee on Electromagnetic Compatibility).

The SMB has approved the nomination of Mark Frimann for a first term of office as member of ACEA to replace Robert Friedman as the USNC (United States National Committee) representative. Frimann's term of office runs from 2011-09-01 to 2014-08-31.

Frimann works in Product Stewardship Management for Texas Instruments Semiconductor Corporate Quality Member Group, US. The role addresses the growing needs of customers and increasing regulatory requirements.

Helping developing countries

IEC Affiliate Programme provides assistance in using International Standards

This year, the IEC celebrates the tenth anniversary of its special programme for developing countries. Known as the Affiliate Country Programme, it concentrates on those areas that are of interest to developing countries in the process of setting up their own national energy, construction and engineering infrastructures. It provides countries with a greater awareness of the world of the IEC and electrotechnology. It helps them understand how existing International Standards can be adopted at a national level, then applied and used for greater safety and efficiency in the context of economical and industrial expansion.

During 2011, the IEC Affiliate Country Programme continued to grow in terms of the numbers of participating countries, of new NECs (National Electrotechnical Committees) established, of the IEC International Standards they had adopted at a



Phuntsho Wangdi of Bhutan is the new Affiliate Leader

national level, and of the personnel directly involved in the Affiliate team.

To date, there are 82 Affiliate Countries, with Azerbaijan being the latest to affiliate. Four countries, namely Moldova, Suriname, Burkina Faso and Malawi, established their own NECs, providing them with a basis from which to expand their future national electrotechnical activities.



Carlos Rodríguez, previous Affiliate Leader, will continue as Affiliate Coordinator for Latin America

37 of the countries in the programme, including 4 that are now IEC Members, have between them to date adopted over 3 500 IEC International Standards at a national level. As proof of their active participation in having set up an NEC and in adopting a minimum of 50 IEC International Standards as national standards, 13 countries have been granted Affiliate Plus status; Malawi is the latest. This enables them to adopt a greater number of IEC International Standards for free and provides them with increased mentoring designed to help their future growth.

During the year, Carlos Rodríguez, Executive Director of INTECO (Instituto de Normas Técnicas de Costa Rica), the Costa Rican standards institution, and Affiliate Leader since 2006, handed over his responsibilities to Phuntsho Wangdi of Bhutan. Wangdi, now Director of the newly-established BSB (Bhutan Standards Bureau), was previously Director of SQCA (Standards & Quality Control Authority), in the Ministry of Works & Human Settlement of Bhutan. As someone closely involved in setting up a new standards organization in a developing country, he brings a new perspective to the Programme, and new ideas.



The IEC Affiliate Programme celebrates its tenth anniversary in 2011



Evah Oduor of Kenya is Affiliate Coordinator for Africa



First capacity building workshop of AFSEC, held in Nairobi, Kenya in September 2011

Rodríguez is not leaving the Programme but will continue to provide support as Affiliate Coordinator for Latin America. In this task, he joins Evah Oduor of Kenya, Affiliate Coordinator for Africa.

In this capacity, Oduor attended two regional events in Africa, the General Assemblies of UPDEA (Union of Producers, Transporters and Distributors of Electric Power in Africa) and ARSO (African Organisation for Standardisation). She was one of the organizers of the first capacity building workshop of AFSEC (African Electrotechnical Standardization Commission), held in Nairobi, Kenya in September 2011, with the support of the IEC.

The IEC-LARC (Latin-America Regional Centre) set up a virtual meeting with the ANDEAN Community of Bolivia, Colombia, Ecuador and Peru. The IEC-APRC (Asia Pacific Regional Centre), while en route to the ASEAN (Association of Southeast Asian Nations) ACCSQ (Consultative Committee for Standards and Quality) meeting in

Cambodia, organized specific training for representatives from Lao PDR and Cambodia .

The IEC has continued to participate in international partnerships for developing

countries, co-chairing the DCMAS Network 11th annual meeting at the ISO Central Secretariat in April 2011 and attending various WTO (World Trade Organisation) meetings at which it was given comprehensive coverage.



The IEC has continued to attend WTO meetings at which it has been given comprehensive coverage

IEC Technical Committee work

Making the world safer, more efficient and interoperable

Carry-on reading

International Standards for multimedia e-publishing

e-books are bringing new opportunities to the publishing industry. Offering more than a mere interface for reading text, e-books can provide much better picture quality than is available on a computer screen; they also offer the ability to create multimedia interactive storytelling. At the same time, e-books offer advertisers new opportunities to reach audiences.

Technologies have improved to such an extent that users now have many choices of screen and also of methods for downloading new material. Some are cross-platform, making them compatible with a variety of systems that offer “carry around” cloud computing-based reading collections. Most, in addition to decoding their own proprietary formats, will read open standard files such as EPUB, the dedicated e-book format, and PDF (portable document format).

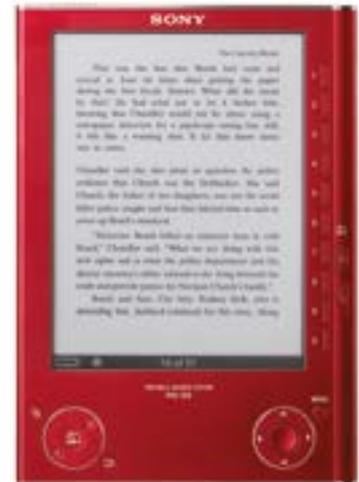
The need to combine portability with the ability to exchange files between systems

calls for standards that will ensure the interconnectability that is crucial to the optimum operation of this digital platform.

IEC TC (Technical Committee) 100, TA (Technical Area) 10: Multimedia, produces International Standards for multimedia e-books, multimedia e-publishing and related technologies. These cover formats of multimedia e-book contents; minimum requirements and user interfaces for multimedia e-book viewers; e-publishing services; and also guidelines for e-book distribution by interchangeable storage media.

In 2011 TC 100 published:

- IEC 62571, *Digital Audiobook File Format and Player Requirements*
- IEC 62605, *Multimedia systems and equipment – Multimedia e-publishing and ebooks – Interchange format for e-dictionaries.*



To exchange files between portable systems requires International Standards that define interconnectability

TC 100/TA 10 is also discussing other important technology areas to establish digital audiobook file formats and player requirements and an interchange format for e-dictionaries, together with a texture map for auditory presentation of printed text.



Energy efficiency starts at home

Standby for better performance

Measuring power consumption

Much is being written and said about the smart homes of the future, with their networked appliances and automated systems, but a networked home also means a home with a large number of appliances on standby. Even in our current ‘un-networked’ homes, standby power accounts for 5 % to 15 % of a household’s power consumption in developing countries and is responsible

for 240 million tonnes of CO₂ emissions a year (or 1 % of global CO₂ emissions) according to the IEA (International Energy Agency).

The IEC recognizes that standby power consumption is an important energy-efficiency issue and for a number of years has been preparing International Standards to measure it



New standby power standards will cut unnecessary waste

efficiently. The IEC also included the reduction of standby power in its list of recommendations in the September 2010 White Paper *Coping with the Energy Challenge*.

IEC TC 59: Performance of household and similar electrical appliances, focuses on the need to develop products that have a reduced environmental impact; this led to publication of the second edition (in January 2011) of International Standard IEC 62301, *Household electrical appliances – Measurement of standby power*, which is widely used by manufacturers and regulators. The second edition comprises a technical revision and improved test method for measuring the standby power consumption of all household appliances. MT (Maintenance Team) 9:

Measurement of standby power, which replaced WG 9 in 2005, is tasked with maintaining IEC 62301.

IEC TC 100: Audio, video and multimedia systems and equipment, aims to achieve standardization within the fast moving sector of multimedia technology and also provides standardized methods for the measurement of power consumption as specified in IEC 62087-BD, *Methods of measurement for the power consumption of audio, video and related equipment*. It is the third edition of the International Standard prepared by TA (Technical Area) 12: Colour measurement and management, and as well as standby, covers measurement of consumption in on-and off-power modes.

Ultrasonics

Micro erosion through imploding vacuum bubbles



Dental descaler uses ultrasonics to ensure effective and painless cleaning of teeth
Photo: Ultrasonic scaler by Amdent

A trip to the hygienist might be less daunting than a visit to the dentist, but even so, most of us probably spend our time in the hygienist's chair willing the process to be over. We are less likely to occupy ourselves examining the equipment used to clean and descale our teeth. But the ultrasonic descalers used today are an impressive piece of medical equipment; the tip of the descaler vibrates at a high frequency of 25 000 to 40 000 cycles a second or even higher, to break down the bacterial matter to which plaque and calculus stick. The efficiency of the cleaning depends on the amplitude of the vibration.

Ultrasonic equipment is widely used in clinical practice for medical diagnosis, for example in monitoring and imaging subcutaneous tissues such as internal organs, tendons and so on. It works by high-frequency sound waves being emitted from an ultrasonic transducer (a hand-held probe) and directed into the body. When a sound wave hits an

internal organ, fluid or tissues it bounces back and the transducer records the tiny changes in the sound's pitch and direction. These are measured by a computer and turned into a real-time picture. When entering the body ultrasound causes molecular friction which results in soft tissue heating slightly.

The heat caused by diagnostic medical equipment is so low that it is dissipated by the tissue and is harmless but, as the field of medical diagnostic ultrasonic equipment expands, the need has arisen to establish a means for determining levels of exposure. With that in mind, IEC TC 87: Ultrasonics, published a new edition of IEC 62359, *Ultrasonics – Field characterization – Test methods for the determination of thermal and mechanical indices related to medical diagnostic ultrasonic fields*, in October 2010. The publication provides improved test methods to determine the relevant indices and exposure parameters resulting from the thermal effects generated by ultrasound, as well as specifying exposure

parameters for certain non-thermal effects. TC 87, whose work also covers sectors for defence and the manufacturing industry, is currently working on a new amendment to the second edition of IEC 61157, *Standard means for the reporting of the acoustic output of medical diagnostic ultrasonic equipment*.

Ultrasonics has been used in dentistry since the mid-1950s to loosen plaque and calculus which, if they are left in place, can have a disastrous effect on gums and teeth.

International Standard IEC 61205, *Ultrasonics – Dental descaler systems –*

Measurement and declaration of the output characteristics, is published by TC 87/WG (Working Group) 7: Ultrasonic surgical equipment. It specifies standard methods of measurement and the essential characteristics of ultrasonic dental descalers.

Tiger in the tank

Getting from A to Z – sustainably

The stakes in EVs are high and growing. The motor industry considers EVs to be key to providing sustainable transportation for people and merchandise while reducing emissions and dependency on fossil fuel. Manufacturers are constantly announcing new technical developments that, in one way or another, relate to electric vehicles.

Establishment of international electro-technical standards is important not only for the batteries and charging systems of EVs (electrical vehicles), but also to ensure that a reliable supply of electric power is available from the grid.

Standardization must be quick and international to allow technology to roll out on a global basis and to develop a durable infrastructure with no tendency to exhibit the market fragmentation that would result from the existence of incompatible charging systems. At the same time, ensuring the

reliability, safety and performance of any transportation system also means taking into account what already exists in terms of electrical systems, plugs and chargers. In addition to IEC TC (Technical Committee) 69: Electric road vehicles and electric industrial trucks, there are other IEC TCs and SCs (Subcommittees), such as IEC SC 23H: Industrial plugs and socket-outlets, which are involved in the preparation of the relevant International Standards. The Committees address component areas such as cables, connectors, relays, batteries, displays and countless other electrical and electronic devices and systems.

In July 2011, SC 23H produced the FDIS (Final Draft International Standard) for two new publications, IEC 62196-1, *Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles – Part 1: General requirements*, and IEC 62196-2, *Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles – Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories*.



Recharging EVs anywhere will be possible with International Standards



The power of a sustainable motor – with a gentle purr

Risk management

Ensuring the safety of patients and medical carers

Much needs to be safeguarded in healthcare. One aspect concerns the safety of the patients themselves... Equally important is the safety of those who operate the systems used

to diagnose medical conditions. And, as systems become increasingly complex and physicians demand greater precision in diagnostics, so the static and electromagnetic fields of,

for example, imaging equipment, are increasing in strength and with them, the associated potential health risks. This makes the question of patient and worker safety even more pertinent. ►



Getting ready for a scan

► **Such risks are not confined to a hospital setting. Today, EMDs (electronic medical devices) are also used in private homes or workplaces to monitor medical conditions or assist with daily activities. Improperly connected networked devices could lead to incorrect monitoring and with it injuries and fatalities.**

Furthermore, EMDs frequently need to be interconnected or linked between homes or offices and a medical facility. Such connectivity requires better control of the protection, integrity and transmission of medical data.

IEC TC (Technical Committee) 62 meets these challenges by producing standards that ensure the safe operation of EMDs in medical practice. The committee was established in 1968. It has four SCs (Subcommittees) that deal with very distinct domains and issue all its publications.

A symposium centred around IEC 80001-1, *Application of risk management for IT-networks incorporating medical devices - Part 1: Roles, responsibilities and activities*, was organized in Brussels, Belgium, on 17-18 March 2011. This symposium brought together decision-makers from hospitals and health-care delivery organizations, as well as R&D, compliance managers and product managers from medical device manufacturers and providers of IT infrastructure and services.

In April 2011, IEC 60601-1-SER *Medical electrical equipment – All parts*, was made available on a single CD. With greater reliance on technology to treat a growing aging population in many countries, the use of electrical devices and systems in the medical domain is bound to increase. It is to be expected that the work of IEC TC 62 and its SCs will follow a similar trend.

H-to-H₂O

Sustainable transport turns to vapour

Fuel cell technologies are developing rapidly and their use is spreading. From buses and aeroplanes to robots and medical equipment such as wheelchairs, new commercial applications are constantly being developed. Although fuel cell power systems are still relatively new, the technology has moved on rapidly from the R&D (research and development) stage to commercialization.

There is a growing demand for new techniques for storing energy at the same time as addressing other concerns such as producing lower emissions and providing energy efficient alternatives to fossil fuels. Fuel cells work by converting an external fuel source such as hydrogen with an oxidant to produce a chemical

reaction. There is zero impact on the environment since the only by-products of the production of electricity are water and heat.

Various manufacturers are investigating the possibilities that fuel cells can provide

as recharging devices for lithium-ion batteries in electrically powered vehicles. One of the obstacles to the wider application of fuel cell technology is that hydrogen, as a particularly light gas, is difficult to store in a small space. Urban bus systems are often used to exploit the



Urban buses offer interesting prospects for fuel cell applications
Photo: Jeff Crandall, Connecticut Center for Advanced Technology, Inc.

technology: they can store relatively large amounts of fuel and can be refuelled at fleet depots. Other applications for fuel cell systems include buildings, laptop computers, phones and construction machines.

By 2020 the size of the market for fuel cells has been estimated to be in the region of USD 10 billion. In recognition of the likely long-term viability of fuel cell technology, IEC TC (Technical Committee) 105: Fuel cell technologies,

was set up in 2000 “with the aim of developing safety and performance related standards for fuel cell appliances”. Its Secretary, Wolfgang Winkler, believes that International Standards will prove particularly helpful in opening up the market; they will reassure potential investors that the groundwork has already been done, so reducing the risk of investment.

The TC’s Strategic Business Plan also stresses the importance of ensuring

that International Standards aid commercialization while not hindering the development of this relatively young technology. Finally, TC 105 recognizes that it has an important role to play in encouraging National Committees to contribute to its standardization work. The resultant International Standards need to be implemented at national and regional levels in order to promote an internationally valid set of standards that will help move fuel cell technology forward.

What’s cooking?

Kitchen aids measure up

The ability to measure the performance of electric cooking ranges, hobs, ovens and grills designed for household use is essential for producers, as low power consumption represents a powerful selling point for appliances. It is also important from a consumer perspective, as these appliances make up a fairly significant share of households’ electricity bills.

Cookin’ and steamin’

SC (Subcommittee) 59K: Ovens and microwave ovens, cooking ranges and similar appliances, will release two International Standards in the IEC 60350 series as FDIS (Final Draft International Standards) at the end of this year. SC 59 K is a subcommittee of TC 59: Performance of household and similar electrical appliances. The standards are being released because it has been decided to separate the current International Standard, IEC 60350 Ed. 2.0, *Electric cooking ranges, hobs, ovens and grills for household use - Methods for measuring performance*, into two parts. The first, IEC 60350-1 Ed 1.0, covers cooking ranges, ovens and steam ovens. The second, IEC 60350-2 Ed 1.0, covers hobs. IEC 60350 Ed 2.0 will

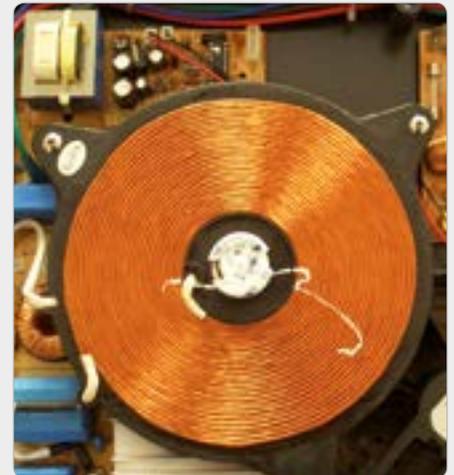
be withdrawn once the new standards are published.

Scope

These new International Standards specify the methods to be used for measuring the performance of household electric cooking appliances, ranges, ovens, steam ovens, grills and hobs. They do not apply to microwave ovens or portable appliances for cooking, grilling, steaming and similar functions, which are covered by two separate International Standards.

The new International Standards list measurements, the general conditions relating to the measurements – including the instrumentation and positioning – and the dimensions and mass of the various appliances. Their scope includes the accuracy of the devices’ controls, heat distribution mechanisms, energy consumption when cooking and the ability to supply steam when relevant, as well as cleaning (in the case of pyrolytic self-cleaning ovens or those with catalytic cleaning functionality).

These standards will support the industry’s efforts to produce more efficient appliances.



Induction cooker coil and electronics



Electric oven/grill - Photo Miele

All-weather shelters

Protecting electric installations from the weather and other hazards

Safeguarding outdoor electrical installations from the weather and other potential environmental or accidental hazards is essential for their proper operation as well as for safety. Outdoor enclosures that are unobtrusive and are therefore frequently overlooked by the general public, are central to this protection. Preparing International Standards for stationary outdoor enclosures is the responsibility of IEC SC (Subcommittee) 48D: Mechanical structures for electronic equipment.

Modular design

Outdoor enclosures are designed to contain a wide range of installations and protect them against the effects of the environment. Installations may include communication systems and industrial and signal controls. The enclosures must be designed to house equipment that is fitted in sub-racks of set dimensions as well as cabling, power supplies, batteries and cooling/heating



Outdoor enclosure: Deceptively simple, but internally complex and essential

devices. This means that they must also comply with all existing relevant standards for the relevant type of equipment.

All-round protection

Outdoor enclosures can be installed in a variety of ways. They can be wall-mounted or installed on top of a building, fitted to a pole or left free-standing on the ground. As such, they must also meet a number of different conditions to protect them from the effects of the weather (sun, rain, heat, cold,

humidity, etc.) as well as of various corrosive substances (dust, gases and liquids).

New standards to be released shortly

The final versions of the three parts of IEC 61969 Ed. 2.0, *Mechanical structures for electronic equipment - Outdoor enclosures*, will be published in the coming months. They concern Design guidelines; Coordination dimensions; and Environmental requirements, tests and safety aspects.

Not just a box...

While they are designed to be inconspicuous, outdoor enclosures are pervasive in the modern environment. Considering all the requirements they must meet and the devices they incorporate, they are a lot more than a mere and unremarkable grey box. Thanks to IEC SC 48D, they are carefully-designed pieces of equipment that form a vital part of a larger puzzle in which the IEC's work can be found at all levels.

Hands-on

Safe and efficient electric tools

For gardening and DIY (do-it-yourself), many of us use electric tools in and around the home. We expect not only that they will do the job at hand but also that they will work safely and reliably. IEC TC (Technical Committee) 116: Safety of motor-operated electric tools, has published International Standards that cover specific safety requirements for hand-held electric tools such as saws, drills, trimmers, sanders, hammers and spray guns as well as for hand-held motor-operated electric tools such as circular and other saws, threading machines, etc. They take into consideration the common hazards encountered in the normal use



Making light work of hard gardening tasks thanks to electric tools (Photo: Bosch)

and (reasonably foreseeable) misuse of the tools and cover general and specific safety requirements so that we can be hands-on without taking our hands off as we work.

With the increasing popularity of battery-operated cordless power tools, the IEC International Standards prepared by IEC SC (Subcommittee) 21A: Secondary cells and batteries containing alkaline or other non-acid electrolytes, have an essential role to play. They provide the technical specifications and testing requirements that are needed to evaluate the safety and operating performance of the batteries used in these devices. A cordless tool also has the advantage that it doesn't need to be connected to the mains, except for recharging. This removes the risk of accidentally cutting through or damaging the power cord. However, dust and water can also harm the tool and put the user at risk. That's why all new power tools are tested against IEC 60529, which rates their dust and water resistance using the IP (Ingress Protection) Rating code. The

standard is prepared by TC 70: Degrees of protection provided by enclosures.

Additional safety measures are needed for tools that cut – for example, hedge trimmers. They usually require the user to press two contacts simultaneously, using both hands. If one of the contacts is released, the device stops. RCD (residual current device) sensors react to changes in the flow of electricity and are managed by IEC SC 23E: Circuit-breakers and similar equipment for household use.

Another area that depends strongly on IEC work concerns the electronic components that are part of a growing number of tools and devices. One example is the battery-powered robotic lawn mower. It has sensors that recognize when it is on grass that has to be cut and others that make it change direction when it reaches walkways or patios. Such a lawn mower not only needs high-quality electronic components to enable it to function reliably, its manufacturer also needs to prove that the device complies with hazardous



Li-ion battery pack for garden and hoe tool (Photo: Bosch)

substances requirements – for all of this, manufacturers look to IECQ, the IEC Quality Assessment System for Electronic Components.

Moving billions every day

Shifting the load

Elevators, escalators and moving walkways carry billions of people each day. This form of transport is used by a number equivalent to the population of the entire world at least every other day. These complex systems rely entirely on electrical or electronic parts to function. They account for 2 % to 10 % of the energy used in commercial buildings, so cutting their power consumption is important.

Nearly 160, but leaner and meaner

The safety elevator, as we know it today, was introduced nearly 160 years ago, and the first electric elevator 30 years later. The first patents for escalators were filed in the 1890s. ▶



Energy-efficient escalators will help cut the power consumption of buildings

TECHNICAL COMMITTEE

- ▶ Escalators are the most convenient way of moving large flows of people continuously in large stores, railway and underground stations and airport halls. Elevators are more efficient at carrying smaller numbers of people on an intermittent basis.

Energy-saving systems

The current generations of elevators and escalators are significantly more energy-efficient than their predecessors. Innovative motors and machine room-less systems in which the motor, controller and other components are placed on top of the cabin, and regenerative braking systems that use the energy recovered

when braking or slowing the cabin, help cut elevator power consumption.

Escalators can be made more efficient by:

- Mounting sensors that will turn them off when not in use
- Fitting energy-saving soft start systems that cut consumption when the number of people carried is low
- Installing variable frequency drives and sensors to reduce their speed

IEC central to efficient and safe operation

Many IEC TCs (Technical Committees) are involved in the preparation of International

Standards that ensure these complex systems work as efficiently and safely as possible. A non-exhaustive list of such TCs and SCs (Subcommittees) includes:

TC 17: Switchgear and controlgear

TC 20: Electric cables, which prepares International Standards for rubber-insulated cables for elevators

TC 34: Lamps and related equipment

TC 47: Semiconductor devices, for sensors and other systems

SC 61D: Appliances for air-conditioning for household and similar purposes.

Sensors everywhere

Impulses that help us control our environment

A sensor is a device that responds to a physical stimulus such as heat, light, sound, pressure, magnetism or motion and transmits an impulse that is used to generate an action, such as on-off, close/open or start/stop.

Sensors are all around us; they are incredibly versatile tools, which are used in all kinds of automated processes – for example, to open and close doors, activate alarms, measure temperature or capture images. Essentially, anywhere you have a system with added intelligence, there is likely to be at least one sensor.

The rules that guide sensors and their work are an integral part of many IEC International Standards, for example the IEC 61508 series *Functional Safety* that was developed by IEC SC (Subcommittee) 65A: Industrial-process measurement, control and automation or IEC 61757, *Fibre optic sensors*, developed by

IEC SC 86C: Fibre optic systems and active devices. IEC TC (Technical Committee) 47: Semiconductor devices, includes sensors in a number of its publications and so does IEC TC 76: Optical radiation safety and laser equipment; the list could go on and on. The fact is: a sensor is a component that can be used in a multitude of systems and devices. The field of application is enormous and comprises anything from semiconductors to Smart Grids, household devices to manufacturing, robotics and more.

Take, for example, the sensors that are used in intelligent buildings, where they allow power consumption to be detected, measured and controlled, and devices to be activated or shut-off. By relaying information to intelligent systems, sensors help detect whether or not a room is occupied, and measure ambient temperature to enable lighting, heating and air-conditioning to be controlled automatically. Wind-speed can be



Easy to install, this sensor can be placed round existing cabling. Source: Thomasnet.com

measured to provide automatic opening and closing of shutters; obstacles and passing people can be sensed to allow doors to open and close automatically and elevators can be made to stop smoothly at exactly the right level.

Sensors have a bright future in our increasingly automated world.

Robots at your service!

An army on the move

Service robots are proving increasingly valuable. They help deal with the consequences of industrial or natural disasters and other dangerous situations. They have opened up many opportunities in the health sector, from performing (or helping to perform) operations to rehabilitation, from remote diagnosis to assistance for the elderly and disabled. Home robots are also becoming more and more popular as they help tackle basic household chores.

Hazards

Robots and automated systems are being deployed more and more frequently to enter buildings, clean obstacles and rescue people following natural disasters such as earthquakes or landslides, or industrial accidents.

These robots are direct spin-offs of machines originally developed for use in the defence sector. They are robust and capable of operating in contaminated environments. New applications are being found for such systems, in particular in the treatment of toxic and dangerous waste.

Healthcare

Robotic systems are also being increasingly used in the medical domain, in particular in surgery. They allow very complex operations to be performed more safely in specialist areas such as cardiothoracic and orthopaedic surgery, and quicker recovery times often result. They are also used to improve therapy and help patients regain the use of limbs or their mobility faster after strokes, spinal cord injuries or other lesions of the central nervous system.

As the world's population ages and requires more care, service robots are being developed to support both patients and medical staff. Devices capable of lifting and assisting disabled and elderly patients or helping them cope with day-to-day activities are being introduced.

Domestic aides

Modern households rely more and more on appliances to carry out a variety of tasks. Vacuum cleaning robots were first launched in 2001; like their floor-washing counterparts, which were introduced later, they play their part doing the chores.

They have to be compact to cover the greatest possible range of surfaces (wood, tiles or carpets), clean corners and along walls, and reach under furniture. They must also be able to move independently, negotiate their way around obstacles in rooms and meet certain conditions as regards safety and performance.

No robots without International Standards...

Being essentially electromechanical systems, robots depend on International Standards to ensure proper and safe operation. Many of these are prepared by various IEC TCs (Technical Committees) and their SCs (Subcommittees). They include TC 47: Semiconductor devices, TC 44: Safety of machinery – Electrotechnical aspects, and SC 65 A: Industrial process measurement, control and automation – Systems aspects.



Using robots to work in contaminated environments. Photo: iRobot

A Joint Working Group, JWG 9, bringing together IEC SC 62A: Common aspects of electrical equipment used in medical practice, and ISO (International Organization for Standardization) TC 184/SC 2, was formed in June 2011 to prepare and publish International Standards that will help develop safe medical robots and contribute to their global introduction.



Special friend for special needs - robot as teaching aid
Source: Bridgets light blog

Getting in and out

Access versus accessibility

Access to a great number of places is, today, largely controlled by machines. Gone are the days when the smiling man was there at the entry point to provide access or to lift the barrier and wave you through. Today you are more likely to be greeted by electronic barriers that demand authorization in the form of smartcards and codes, finger prints or facial recognition before you can enter a site. While many of us take this form of controlled access for granted, others don't find it so easy to use the systems.

Controlling and granting access

For security and confidentiality reasons, access to buildings and places is often restricted. There are turnstiles and automatic doors controlled by electronic sensors and video devices that are capable of identifying people and vehicles and that can track authorisation and trace movements. The information they register can be saved in databases for ulterior uses. Access control has become highly sophisticated.

Easing accessibility

On the other hand, a growing number of people find controlled access systems hard to deal with. The average age of the world's population is increasing and the number of people living with a disability, be it moderate or severe, has increased. It is important, when designing and producing electrotechnical products, to cater too for the category of people who find it difficult to see small buttons or cannot distinguish particular colours, those who perhaps need more time to get through a closing door, or can no longer



Access control has become increasingly sophisticated



Many TCs are now addressing the problem of accessibility in order to cater for the category of people living with a disability, be it moderate or severe

reach plugs or controls that are placed particularly high or low.

IEC/TR (Technical Report) 62678, *Audio, video and multimedia systems and equipment activities and considerations related to accessibility and usability*, is published by IEC TC (Technical Committee) 100: Audio, visual and multimedia systems and equipment.

It marks the result of extraordinary co-operation between, and contributions from, a wide range of experts. Many other IEC TCs also have addressed standards relevant to accessibility in order to provide graphical symbols; marking and identification; electrical accessories; semiconductor devices and sensors and so on.

IEC supports renewable energies

Wind, water and sun come into play

Global energy needs are increasing constantly and with the diminishing supply of fossil fuels and rising environmental and safety concerns, renewables are likely to occupy a growing share of the future energy mix. Through the work both of long-established and newly-created TCs (Technical Committees) the IEC is promoting the development of renewable sources for electricity production.

Electricity fastest growing; renewables more cost-effective

According to IEA (International Energy Agency) data, electricity has been the world's fastest-growing form of end-use energy consumption in the past four decades. It increased by 246 % between 1973 and 2008, whilst overall energy consumption from all sources went up by 31 %.

Where production is concerned, the energy payback – that is the ratio of total energy produced during a system's normal life cycle, divided by the energy required to build, maintain and fuel it – is much higher for electricity generated from renewable sources than that produced using fossil fuels. Hydropower achieves ratios of 170 – 267, assuming a lifespan of 100 years, the return for large wind turbines is 34, whilst fossil fuels have energy payback ratios of between 1,6 and 7.

Water power

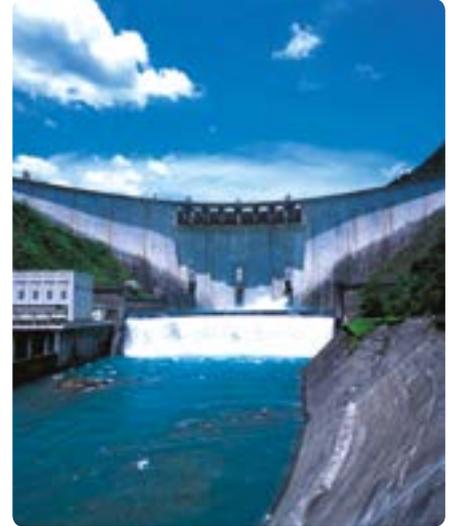
Water was a source of energy long before its power was harnessed to produce electricity. Watermills and waterwheels have been used since ancient times in many parts of the world, initially for irrigation, then to mill grain and cut wood and stone, and later to power machinery in mining and other industries.

Hydropower was first used to produce electricity in the early 1880s. By 1889, 200 electric plants in the US used water power for some or all of the electricity they generated. Today, hydroelectricity forms the basis of around 16 % of global electricity production and accounts for some 85 % of the total output from renewable sources; most of the production is from large-scale systems.

As many countries are reassessing, curtailing or even cancelling their nuclear power projects, hydropower's share of electricity generation is bound to increase significantly given the huge untapped resources of water that exist. Some countries, such as Norway and Brazil, already derive the vast majority of their electricity from hydropower (around 99 % and 85 % respectively).

IEC TC 4: Hydraulic turbines, established in 1913, was one of the very first IEC TCs. It is "responsible for the preparation, periodic review and updating of standards and technical reports covering the design, manufacturing and rehabilitation, commissioning, testing and operation of hydraulic machines including turbines, storage pumps and pump-turbines of all types as well as related equipment." Its Chairman Elect, Jean-Paul Rigg, outlined for *e-tech* some of the challenges that face the sector as well as the opportunities it offers.

"Generating equipment used in hydroelectric installations is a mature technology, achieving efficiency rates of 93 % or even more," Rigg said. "Recent improvements have concerned materials, turbines, bearings, lubricants and instrumentation to ensure the longest possible lifespan of equipment and optimize maintenance," he added.



Hydroelectric dam. Source: infobarrel.com



Hydroelectricity in Vianden: subterranean hydroelectric power station and reservoirs
Copyright: eu2005.lu/SEO

Initial construction costs are high, but installations last much longer than is the case for other power-generating systems.

Small is powerful

Mentions of hydroelectricity invoke images of large dams and of massive and costly installations. The huge potential of smaller installations is often overlooked. Small hydro systems may offer attractive

alternatives where the construction of dams proves impossible, impractical or too costly. They can provide electricity for centralized or isolated grids as well as for off-grid power supplies.

The generally accepted definition of SHP (Small Hydro Power) systems includes micro (5 to 100 kW), mini (100 kW to 1 MW) and small (1 to 50 MW) projects that can be run-of-river or reservoir-based. They are reliable, have minimal operating costs, a small environmental impact and use scaled-down versions of existing large hydro turbines.

China offers a striking illustration of the potential of small hydro systems, Rigg told *e-tech*. A survey of SHP development by the Hangzhou International Center on Small Hydro Power, which describes the three phases of this development, confirms this. The first phase

(1950s-1970s) saw SHP being used mainly for domestic lighting. In 1949 there were only 52 SHP stations, by the end of 1960 the number had reached 8 975 – most with a very small installed capacity, 28 kW on average (for a total capacity of 252 MW).

The second phase (1980s-1990s) saw SHP being installed to alleviate poverty in poor areas. By the end of 1996, 45 174 SHP stations were in operation, with an installed capacity of 19,2 GW, representing 34,5 % of China's total hydropower capacity.

The third phase of China's SHP plan was launched in the early 2000s; its declared aim was to introduce an ecological protection programme to replace firewood with SHP. Further expansion is possible as the exploitable SHP potential of the country is estimated at 120 GW. Many

other countries in Asia and Latin America also have a significant SHP potential.

From rivers to the sea...

Electricity production from water resources is not limited to inland lakes and waterways, but extends to the marine environment too. Research into harnessing the energy from waves, tidal and water currents has been on-going for over 30 years, yet the technologies developed to install systems are still at an early stage.

The IEC established TC 114: Marine energy – Wave, tidal and other water current converters, in 2007. The scope of this TC is to prepare international standards for marine energy conversion systems and to ensure that the technologies employed have a low environmental impact in highly sensitive marine locations.

The future is bright, the future is sunny...

According to research published by the IEA in September 2011, solar energy from PV (photovoltaic) systems and CSP (Concentrated Solar Power) sources could provide the bulk of the world's power by 2060. Most heating and transport applications could switch their power source from fossil fuels to electric power within 50 years.

TC 82: Solar photovoltaic energy systems, was established in 1981. Its remit is "to prepare international standards for systems of photovoltaic conversion of solar energy into electrical energy and for all the elements in the entire photovoltaic energy system". As PV systems use semiconductors, TC 47: Semiconductor devices, also works closely with TC 82.

The international PV market grew at an astonishing CAGR (Compound Annual Growth Rate) of 40 % between 1981 and 2010 and is expected to grow by an additional 30 % until 2020, according to TC 82 Chairman Heinz Ossenbrink. PV systems are suitable for small off-grid and grid-connected installations. They have benefited from significant reductions



New SunCatcher™ power system developed by Tessera Solar and Stirling Energy Systems

in production costs and from technical innovations that have facilitated their extension to many installations other than traditional solar panel arrays.

CSP systems are employed in solar thermal electric plants to produce electricity. Reflective material is used to concentrate the sun's heat which then drives steam or gas turbines, or other engines, to produce electricity. The systems offer good predictability and reliability of production as installations are located in areas with high daily levels of sunlight. They also benefit from efficient storage and backup possibilities, are cost-competitive compared with other renewables and offer potential for significant technological progress.

After more than 25 years of testing, CSP has moved from a research phase to industrial deployment. To reflect this development, the IEC established TC 117: Solar thermal electric plants, in 2011.

Going with the wind

Like water, wind has been used as a source of energy from ancient times, to power ships, to grind grain in windmills, or to pump water. The introduction of small wind turbines to pump water and produce electricity for a home or small cluster of houses dates back to the late 19th century. The modern wind power sector started in the early 1980s, with turbines that would be considered small by today's standards (20-30 kW each). Work is currently under way on 10 MW turbines and commercial wind farms are now installed in some 80 countries.

IEC TC 88: wind turbines, was established in 1987. Its scope is "to prepare International Standards for wind turbines that convert wind energy into electrical energy". Indications of the global potential of wind energy can be deducted from an IEA 2010 reference scenario for wind power. It forecasts capacities of 415 GW for 2020 and 573 GW for 2030 (from 185 GW in 2010).

Wind turbines may also be adapted to the landscape. In Japan, for instance, wind turbines with tilting heads are being installed in mountainous regions to enable them to benefit from different wind directions on slopes. Another example of technological development, the "wind lens" aerodynamic innovation being developed by Japan's Kyushu University, is said to triple the output of a typical wind turbine, making it less costly than electricity from nuclear power.

Wind power generation is not limited to large installations with dozens of huge wind turbines spinning slowly in land-based or offshore wind farms. To circumvent the environmental and physical limitations of large wind turbines, smaller systems that are often unobtrusive, such as vertical axis wind turbines, have been developed to fit in urban environments.

Levelling supply

One of the shortcomings of solar or wind as renewable energies is the unpredictability of their output, which requires regulation. Hydropower has the ability to deliver power on demand and at very short notice, enabling power production to be matched to supply requirements.

The IEC and its TCs will help renewable energies to expand rapidly, ensure that they complement each other and integrate seamlessly into the future electricity production mix.



*Vestas wind turbine in Portugal
(source: Vestas Wind Systems A/S)*

A study under natural sunlight

Providing comprehensive rating information for photovoltaic modules

A study by Arizona State University Photovoltaic Reliability Laboratory (PRL) based on IEC 61852-1 provides insights into the difficulty of assessing photovoltaic performance testing. Excerpts are published with the permission of Solar ABCs (Solar America Board for Codes and Standards). Link to full report: [http://www.solarabcs.org/about/publications/reports/pv-mod-power-rating/pdfs/PVModulePowerRatingReport.pdf].

More comprehensive information needed

Manufacturers typically rate PV modules at STC (standard test conditions). The STC rating involves only one temperature (25° C), one irradiance (1000 W/m²), and one sunlight spectrum (AM [air mass] 1.5G [global]). However, the actual energy production of field-installed PV modules is a result of a range of operating

temperatures, irradiances, and sunlight spectra. Therefore, there is an urgent need to characterize PV modules at different temperatures and irradiances to provide more comprehensive rating information.

Recognizing this issue, the IEC Technical Committee 82 Working Group 2 (TC 82/WG 2) has been developing an appropriate power and energy rating standard. This IEC 61853 standard titled *Photovoltaic Module Performance Testing and Energy Rating* consists of four parts.

The first part of this four-part standard requires the generation of a 23-element maximum power (P^{max}) matrix at four different temperatures and seven different irradiance levels. The P^{max} matrix can be generated using an indoor solar simulator method or outdoor natural sunlight method. The outdoor test method introduces little/no spectral mismatch error and is much less expensive than the indoor test method because it avoids the use of very expensive solar simulators. However, obtaining an accurate and repeatable P^{max} matrix using the outdoor method over time (several months or years) would be extremely challenging.

Energy rating standard tested

The Arizona State University PRL (Photovoltaic Reliability Laboratory) ran a study (prepared by (Mani) Govindasamy TamizhMani, Karen Paghasian, Joseph Kuitche, Meena Gupta Vemula, Ganesh Sivasubramanian) related to the power rating of PV modules using natural sunlight. Study title: *Photovoltaic Module Power Rating IEC 61853-1 Standard: A Study Under Natural Sunlight*.

The objectives of this study were to:

- identify measurement repeatability issues with a non-standardized test setup,

- standardize the measurement setup,
- verify the device linearity per IEC 60904-10,
- generate the power (P^{max}) matrix per IEC 61853-1, and
- validate four different current-voltage translation/interpolation techniques of IEC 60891 and the National Renewable Energy Laboratory Method (NREL Method).

Study methodology

The study included two rounds of outdoor measurements. During round one (2009) measurements were carried out to identify the repeatability issues of the non-standardized test setup. In round two (2010) measurements were carried out to standardize the test setup, check the PV device linearity, generate the P^{max} matrix, and validate four different current-voltage (I-V) translation/ interpolation techniques of IEC 60891 and NREL Method.

Based on the round one 2009 study, the authors concluded that the repeatability issues can be minimized to an acceptable level by an appropriate selection of outdoor measurement conditions and test equipment. Outdoor measurement conditions should be clear sunny days (> 90 % direct normal irradiance) at lower air mass values (< 2.5). Test equipment should include:

- a manual or automatic two-axis tracker for tracking the sun;
- a fast (< 1 second) I-V curve tracer to minimize issues related to changing irradiance, spectrum, and module temperature;
- a matched technology (or matched spectral response) reference cell to practically eliminate spectral mismatch error; and
- a pre-cooled test module to naturally change the module temperature while exposed to sunlight (to obtain



data at the temperature of 75°C, a thermal insulating foam can be used to cover the backside of test module).

The 2010 measurements with the standardized test setup (2-inch module-to-screen gap and matched reference cells kept outside the screen) were used to verify the device linearity and to demonstrate that the 23-element P^{max} matrix of IEC 61853-1 standard can be generated using 8 to 23 measured reference I-V curves and four translation/interpolation procedures of IEC 60891 and NREL Method. The study used 23 reference curves for the first two procedures (called translation procedures 1 and 2), and 8 to 10 reference curves for the other two procedures (called interpolation procedures 3 and 4). Procedures 1 and 2 required the use of five mesh screens, and procedures 3 and 4 required only three or four mesh screens to generate the entire 23-element P^{max} matrix of IEC 61853-1. The report presents the power rating results for four commercial module technologies—crystalline silicon (c-Si); amorphous silicon (a-Si); cadmium telluride (CdTe); and copper indium gallium diselenide (CIGS). The authors also present a detailed investigation on the validation of the four translation/interpolation procedures for all four technologies.

The results of this study were recently published in Solar ABCs (extracts reprinted with permission).

Major study conclusions:

- Outdoor measurement repeatability issues: The repeatable power rating measurements at various irradiance levels under natural sunlight within an acceptable deviation limit of 2 % could not be achieved when uncalibrated mesh screens were placed directly (0 inch distance) on the test module and reference cell.
- Standardization of measurement setup: A standardized measurement setup was established with reference cells kept outside the calibrated

mesh screens, which were placed at a 2 inch distance above the test modules.

- Verification of device linearity per IEC 60904-10: The linearity requirements of open-circuit voltage, short-circuit current, and maximum power versus temperature are met by all four test technologies. Similarly, the linearity requirement of open-circuit voltage versus the logarithm of irradiance is also met (with two minor exceptions presumably due to some experimental errors) by all four test technologies. For the short-circuit current versus irradiance, the devices met the linearity requirement (2 % deviation limit) for irradiance levels above 200 W/m^2 but they surprisingly showed a higher deviation for the irradiance levels below 200 W/m^2 . This higher deviation was objectively attributed to some minor experimental errors related to the calibration of low transmittance mesh screens under natural sunlight.
- Generation of P^{max} matrix per IEC 61853-1: The required 23-element P^{max} matrix of

IEC 61853-1 was successfully generated for all four module technologies using the four translation/interpolation procedures of IEC 60891 and NREL Method. Unless the data processing personnel pay extreme attention or commercial test laboratories automate the data processing, the translation procedures (1 and 2) are more prone to human error than the interpolation procedures (3 and 4). However, procedures 1 and 2 would work extremely well if multiple narrow irradiance ranges are used with individual sets of correction values for each narrow irradiance range or multiple sets of correction values are used for a single wide irradiance range.

- Validation of procedures of IEC 60891 and NREL Method: An extensive validation analysis of the four translation/interpolation procedures, at both narrow and wide irradiance ranges indicates that all four procedures are remarkably accurate within an average error of 3 % and a root mean square error (RMSE) of 4,5 %.



Standardized rating for PV modules and system is essential for manufacturers and end-users

Hydropower

Small hydro goes full circle

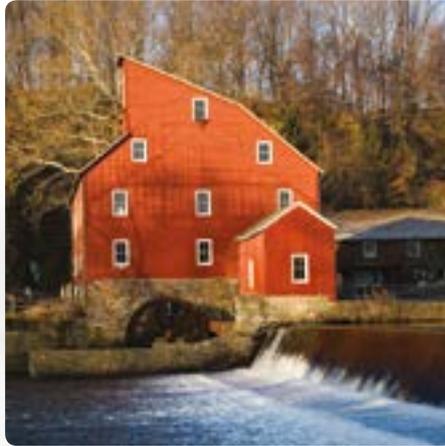
When people think of renewable energy, they often overlook the power of water and its capacity to generate electricity. Yet hydropower is one of the oldest forms both of mechanical and electrical power. Starting in waterwheel-powered mills, water turbines were subsequently developed during the industrial revolution to provide mechanical power to factories.

Once electrical generators were invented, it took only a few years to couple them to hydro turbines to produce hydro-electric power, and soon they were used to supply electricity to remote communities. All of these installations were small hydro. In the 20th century larger hydro schemes were built to supply the higher demands of networks and large scale industry. As the economies of scale increased, so mega projects such as the Grand Coulee, Itaipu and the Three Gorges developed, and small hydro took a back seat to its big brother. However it was found that these large hydro projects had significant social, economic and ecological consequences, although these are ameliorated by modern schemes. Small hydro projects are now experiencing a resurgence because they are much less invasive.

The huge capacity of hydropower

Hydropower has the capacity to generate more electricity than all other renewables combined. The turbine-generators used now are so refined that their combined efficiency can occasionally exceed 95 %, roughly twice that of any other form of electricity generation. (Only cogeneration-plants using waste energy in the form of hot water for district heating can exceed this, and not all of the energy produced is electrical.)

Currently hydropower produces roughly 20 % of global installed electrical power capacity, measured in GW (gigawatt). In



Small and micro hydro power systems can be installed in river or streams with little or no negative environmental impacts

terms of energy production that corresponds to 17 % of the world's total electrical energy measured in GWh (gigawatt hour), and 72 % of all installed renewable electrical energy. Hydropower constitutes over 50 % of the electricity supply in at least 63 countries in the world.

Smaller is less noticeable

Today numerous countries already have large hydropower installations, but if many of the larger economic sites have already been exploited, there are a multitude of lesser sites suitable for small hydro projects that have yet to be developed. While they can be connected to larger grids, they can also be used for rural electrification projects that do not require vast and robust electrical distribution networks.

Many of the environmental difficulties experienced with large hydro do not present a problem for small hydro projects. They can be designed with little or no storage capacity as "run of the river projects". These do not have reservoirs that silt up, nor do they prevent nutrients travelling downstream. They can incorporate fish passes to enable migration to occur so that fish can return to their spawning places.

They do not require any resettlement of local populations or flooding of land for reservoirs and their environmental impact is minimal. Because the civil engineering works are comparatively small scale, these projects can be constructed in as little as 12-18 months, resulting in a fast payback on investment.

IEC TC 4 for every size of hydro

IEC TC 4: Hydraulic Turbines, was established nearly 100 years ago, less than a decade after the IEC was founded. The Technical Committee has produced many International Standards and Technical Reports for equipment for all sizes of hydraulic rotating machinery. TC 4, realizing that small hydro has its own special requirements, produced, for example, IEC 61116, *Equipment guide for small hydro*. This provides background information and checklists of requirements and so ensures that developers are aware of all the issues involved in writing comprehensive specifications.

At the end of 2010, TC 4 produced IEC 62006, *Hydraulic machines – Acceptance tests of small hydroelectric installations*. Other publications on testing and commissioning large hydro systems exist, but these are not always applicable or economically viable for small hydro projects. The new International Standard has taken the relevant parts of these publications and rewritten them specifically from the viewpoint of small hydro systems, adding some extra new material. IEC 62006 provides an appropriate level of performance testing for small hydro projects and deals with the types of turbine specific to them but overlooked by other International Standards. It groups together the relevant rules for safety and performance testing during commissioning and start-up; trial operation and reliability tests; cavitation, noise and vibration guarantees, in a single publication. For many small hydro projects IEC 62006 can be used *per se*, without further reference to multiple other standards.



Cables and connectors

Issue 09/2011 of *e-tech* looks at some of the elements that are fundamental to the many products and systems that rely on IEC International Standards to ensure their safety, durability, compatibility and efficiency. No electrotechnical system can exist without some form of cables, or fuses, switches and connectors, or wiring.

So much today is dependent on correctly designed and installed wiring. The work of IEC TC (Technical Committee) 20: Electric cables, is fundamental to other TCs. Indeed the TC which is responsible for International Standards used for designing, testing and end-use recommendations of all types of cables and wiring, has a Group Safety Function, so many other IEC committees are also reliant on its publications. TC 20's work covers hazards to cables such as fire and the testing of flame propagation which extends to fire resistance. Work covers the testing of the optical density of smoke. It also covers corrosion to cables due to reactions with surrounding chemicals or oxidation of the metals in contact. The TC was established in 1934 and, if to begin with, its work was restricted to HV (high voltage) it quickly took on the additional task of low voltage cables, a group that today is still very much growing, particularly for infrastructure demands, in areas such as superconductivity, polymeric developments and EV (electric vehicle) charging and others where energy efficiency is at a premium.

e-tech also looks at the work of TC 86: Fibre optics, particularly used in the area of communications for telecom and other high-speed interconnecting devices that continue to develop at a tremendous rate due to the ever increasing demand for fast and efficient data transmission both in the private and the commercial sector.

In addition to issue 09/2011 of *e-tech*, there will be a special publication following the IEC General Meeting that will detail some of the sessions and events of the yearly gathering of IEC Executives and Officers, this year organized by the IEC's Australian National Committee and to be held in Melbourne, Australia.



So much today is dependent on correctly designed and installed wiring



e-tech

News & views from the IEC

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