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Your gateway to International Standards

The rise of energy efficiency



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Director of Marketing, Communication and Information | **Nicolas Fleury**

Head of Communication | **Katie Bird**

Editor-in-Chief | **Elizabeth Gasiorowski-Denis**

Editors | **Maria Lazarte, Sandrine Tranchard**

Copy editor and Proofreader | **Vivienne Rojas**

Contributing writer | **Laura Franceschini**

Program Manager, Data Center Sustainability at Google

Designers | **Xela Damond, Pierre Granier, Alexane Rosa**

Translators | **Alexandra Florent, Cécile Nicole Jeannet, Catherine Vincent**

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Harnessing the power of

energy

efficiency

Energy is essential to human beings all over the world. However, it is not unlimited and we need to consider how to utilize it rationally. With very little domestic energy to call its own, Japan has found its way to energy security using a wealth of technologies.

There are so many societal issues facing the world today, such as water scarcity, lack of food, the widening gap between rich and poor, and a shortage of fuels that produce our energy. Japan has few natural resources, making it extremely vulnerable to an energy breakdown. Because of its special circumstances, our country has been a forerunner in solving these worldwide challenges through a raft of innovative solutions, including the efficient and rational use of energy through technologies.

As you may remember, Japan faced two serious oil crises in 1973 and 1979, which threw the country into a deep economic depression that we struggled to get out of. This forced us to radically overhaul our energy policy. That same year, the government of Japan enacted the “Act on the Rational Use of Energy” designed to promote the efficient use of energy in factories, transportation, buildings, machinery and equipment, which became the fundamental policy framework of the Japanese energy conservation efforts.

The Act has been revised and expanded several times over the years to include the latest research

in the field, in a bid to implement a more efficient and rational use of energy. One of the countermeasures to our spiralling energy consumption was the “Top Runner Programme”, introduced in 1999, which is a set of mandatory energy-efficient standards for energy-intensive products. It specifies 31 categories of equipment and appliances incorporating high technologies, designed to stimulate competition among private companies to improve energy consumption efficiency.

However, the Act was not broad enough to apply and promote the programme. Hence the Japanese Industrial Standards Committee (JISC), ISO’s member for Japan, worked with the government in an advisory capacity to develop a number of voluntary standards that would support the Act. For example, the measurement methods for energy consumption efficiency are too detailed to include in the Act, so they are generally established independently based on International Standards and the Japanese Industrial Standard (JIS) when it exists. In order to implement the International Standards or JIS, Japan must also align with the World Trade Organization’s Technical Barriers to Trade Agreement.

What’s more, to promote the Top Runner Programme, we developed the labelling programme in the Act to make it easier to use and understand for consumers. But in the same way that measurement methods could not be explored in detail, so it was difficult to include the full labelling regulations in the Act. That’s why JISC developed JIS C 9901 on methods for calculating and representing the energy efficiency of electrical and electronic appliances, which includes a section on the correct labelling of products. These regulations provided an important contribution to ISO 50001, ISO’s energy management system standard. Since the establishment of ISO technical committees ISO/TC 242 (energy management) and ISO/TC 257 (evaluation of energy savings) – since merged into ISO/TC 301, *Energy management and energy savings* – Japan has contributed extensively to international standards work by sending convenors and experts, submitting comments based on Japanese experience and technologies and hosting working group meetings in Japan. Moreover, the government has imposed the use of ISO 50001 in its national energy policy.

Organizations in Japan also recognize the relevance of ISO 50001 as a means of disseminating their activities abroad. While developing countries appreciate the importance of learning to use their energy wisely, they still face challenges on how to go about it. Hence Japanese organizations have been working closely with them, through schemes like the Asia-Pacific Economic Cooperation (APEC) Multilateral Recognition Arrangement Readiness Project in ISO 50001, which consisted of four training workshops for certification body staff and auditors held in China, Indonesia, Viet Nam and Thailand.



Dr Hiroshi Tomono, JISC President.

Looking to the future, Japan has reason to be positive. In the aftermath of the Great East Japan Earthquake in 2011 and subsequent disaster of the Fukushima nuclear power plant, we have been reviewing our energy policy to impose stricter limits on energy use, and we will do our best moving forward to evolve our energy mix using both regulations and standards. ■

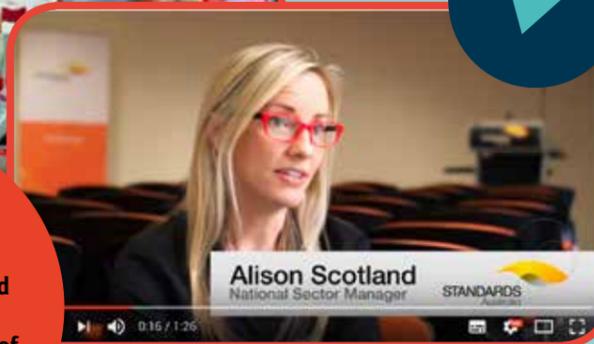
Final countdown

DSM (Malaysia) celebrated its 20th anniversary with a “countdown” on social media. Its dedicated hashtag was #adastandarduntung (standards bring benefits)!



People-focused

SA (Australia) dedicated a video to consumer standards and the work of the ISO Committee on consumer policy on YouTube.



Say cheese!

NEN (The Netherlands) celebrated its 100th anniversary with many exciting initiatives, including an online photo contest so that people could have fun and get creative with standards. #NEN100jr #fotowedstrijd



Members' best practice in a digital world

Social media has opened exciting new possibilities for ISO members to communicate about standards in creative ways. Here are just some examples of what they are doing.



Sporty challenge

DS (Denmark) created some fun infographics on standards in sports to share during the #Rio2016 Olympics.

DS/EN ISO 16180:2013 Fritidsbåde – Navigeringssystem – Installation, placering og synlighed

DS/EN ISO 12402-2:2006 DS/EN ISO 12402-3:2006 DS/EN ISO 12402-4:2006 Redningsveste

DS/EN ISO 8849:2003 Elektrisk betjente kensepumper

DS/EN ISO 8847:2004 Fritidsbåde – Styreinstallation – Kabel- og båndkivesystemer

DS/EN 14810:2006 Bælgninger til sportsarealer – Bestemmelse af anvendelsesområde for piger

DS/EN 14895:2006 DS/EN 14956:2006 Bælgninger til sportsarealer

DS/EN 15288-1 + A1:2012 DS 477:2013 Svømmebadsanlæg – Del 1: Sikkerhedskrav ved projektering og udformning

DS/EN 15288-2:2012 Svømmebadsanlæg – Del 2: Sikkerhedskrav til driften

DS-håndbog 177:2013 Svømmebadsanlæg – med fokus på vandkvalitet

DS/HD 60364-7-702:2010 (SIR) Elektriske lovspændingsinstallationer – Del 7-702: Krav til særlige installationer eller områder – Svømmebassiner og springvand

DS/EN 16381:2014 Kemikalier til behandling af vand i svømmebassiner – Natriumperoxodisulfat

From idea to market

ASI (Austria) developed the award-winning e-learning platform “Von Idee zum Markt” (from idea to market) to teach students the relationship between research and standardization. The platform was promoted via social media, advertorials, newsletters, etc.



Yum!

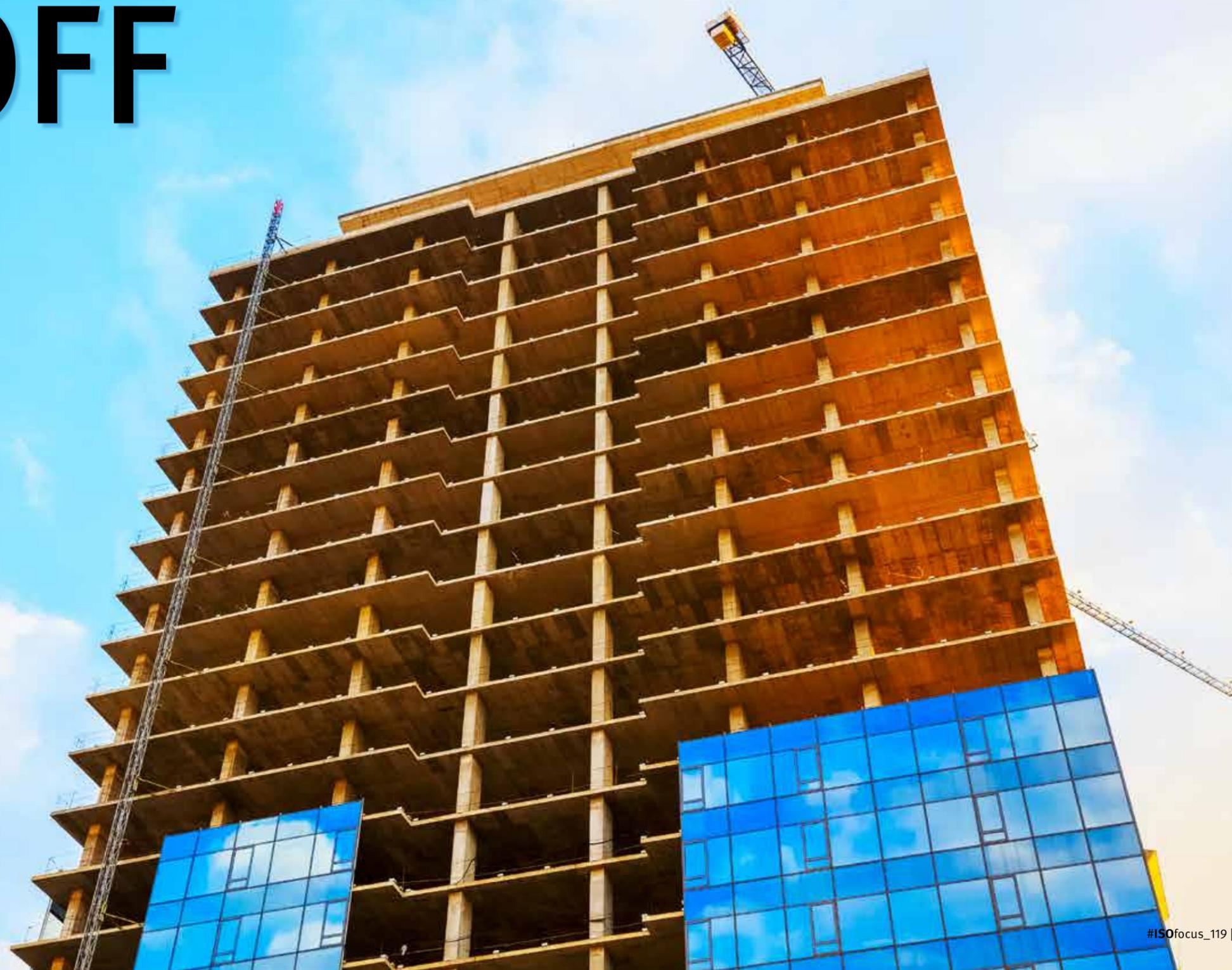
AENOR (Spain) made the connection between standards and the Mediterranean diet with infographics. Hungry yet?



WHY INVESTING IN ENERGY-EFFICIENT BUILDINGS PAYS OFF

by Elizabeth Gasiorowski-Denis

The global building sector has never faced more challenges – from curbing energy use to creating high-performance buildings, while lowering our carbon dioxide emissions and ensuring energy security in the years to come. So how can designing buildings or retrofitting existing ones help meet our climate targets?





Do you know how much electricity your home uses each year? And what about the carbon footprint of your office building? Although many people have a rough idea of how much they spend on fuel bills, they don't often know how much energy they use to power their home (namely for heating, hot water and lighting) – in short, their home's carbon footprint. Which is surprising, because it's the first question to ask yourself if you want to lower the price of your energy bills.

These days, most of us are aware that we need to cut down on our energy consumption with more energy-efficient homes. In fact, A-rated appliances and sound energy conservation strategies can help save money and energy at home. Depending on your budget, plenty of options exist to cut costs – from minor tweaks to major renovations. By applying a range of techniques in the home – some involving just minor adjustments – you can achieve significant savings in energy costs and carbon.

So just imagine all the houses and commercial and public buildings around the world put together. What does this mean in concrete terms? Surprising (or frightening) as it may sound, buildings consume one-third of energy use worldwide and are an equally important source of carbon dioxide emissions, according to the International Energy Agency (IEA) report *Transition to Sustainable Buildings*. What's more, if no action is taken to improve energy efficiency in the building sector, energy demand is expected to rise by 50% by 2050, says the IEA report. Unless we are deliberate in the way we design, construct and renovate buildings, we could “lock in” our cities to inefficient energy use for decades to come.

Action is needed now, not just because of energy trends but also because buildings are a low-replacement industry. It will not be enough merely to act on new buildings. Improving the performance of our existing building stock is incredibly important.

Decarbonizing buildings

Consider this. According to the Intergovernmental Panel on Climate Change (IPCC), “over the whole building stock, the largest portion of carbon savings by 2030 is in retrofitting existing buildings and replacing energy-using equipment”, and energy savings of 50% to 75% can be achieved in commercial buildings that make smart use of energy efficiency measures.



One of the big differences between new and existing buildings is that during the predesign phase of remodels and retrofits, the existing building structure needs to be studied in detail and will introduce a whole set of design constraints. The same design strategies will apply to both, but designers will not have as much latitude to reshape existing buildings.

ISOfocus asked industry experts for their perspectives on these issues and what really needs to be done to improve energy efficiency and ensure that the buildings we build or retrofit contribute to reducing their impact on energy bills, air pollution and carbon emissions – and how ISO standards can help.

The Research Institute for Thermal Insulation (FIW) is one of several leading research and testing institutes for thermal insulation in Germany, with an international sphere of activity. These cover, for example, laboratory investigations, outdoor tests, in situ demonstrations, studies, advanced training and standardization.

Andreas Holm, Head of FIW and Chair of ISO/TC 163, *Thermal performance and energy use in the built*

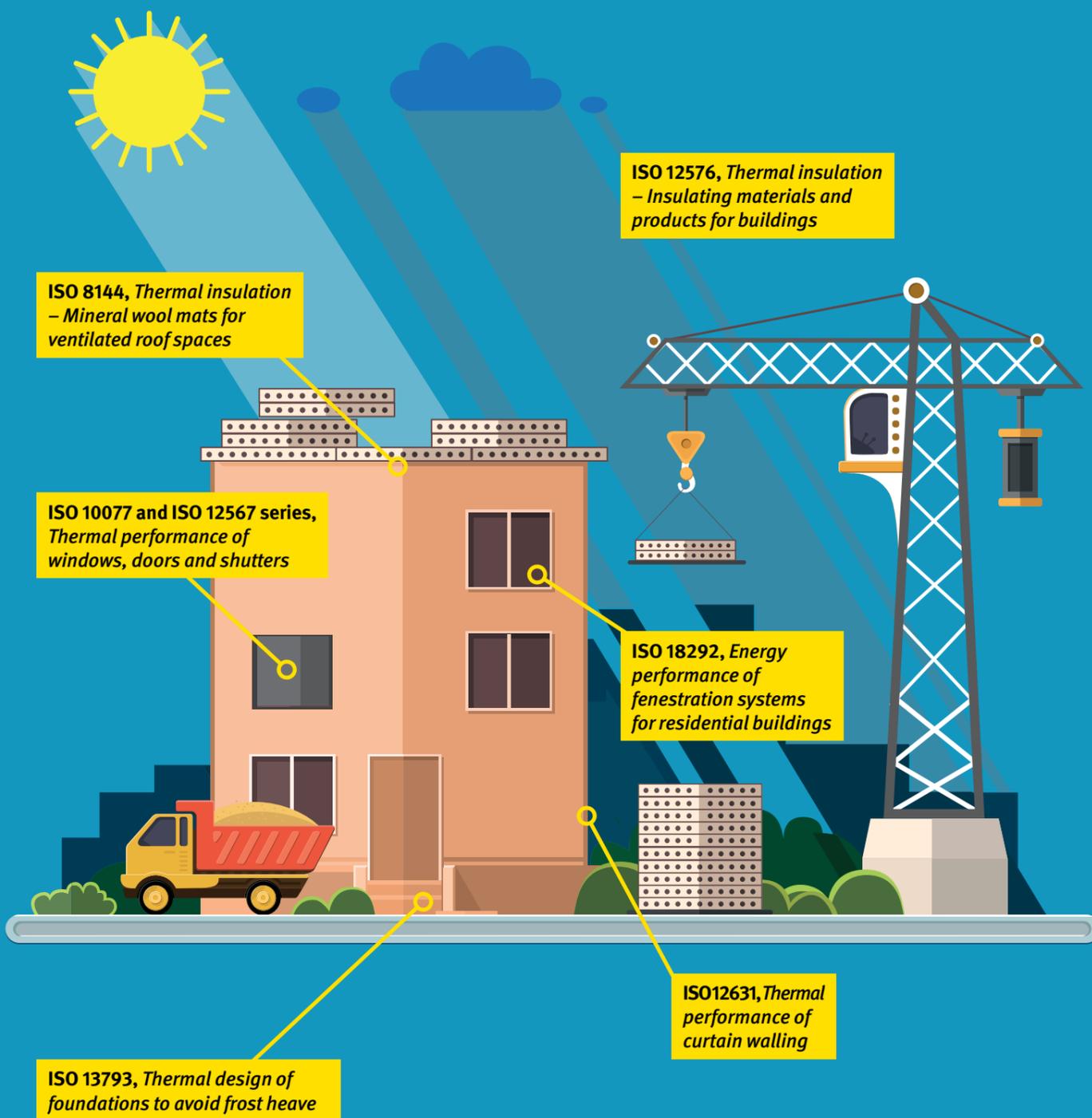
environment, subcommittee SC 1, *Test and measurement methods*, explains that for Germany, like many other European countries, one of the major challenges is adjusting existing buildings to become more efficient. “Many new buildings are built as ‘net zero’ energy, but to make an appreciable impact on overall energy consumption, we need to improve the energy efficiency of existing buildings to fit today's standards.” For Holm, the rate at which old buildings are being retrofitted is too slow, about 1% in much of Central Europe, meaning that it would take a hundred years to work through the stock of buildings we already have.

In most regions of the world, heating and cooling loads represent the largest building-sector energy end-use. Holm says that in most cases, energy is lost through the building envelope – the boundary between the conditioned interior of the building and the outdoors. Retrofitting older buildings can significantly reduce the energy needed to heat and cool them – the only path toward substantially diminishing the energy footprint of the existing building stock.

BUILDING ENERGY PERFORMANCE

how standards can help calculate energy

The thermal properties and individual construction materials of a building envelope (walls, roof and basement) can be calculated using International Standards. Here's how ISO standards can help keep energy costs down and build energy efficiency up.



Why energy efficiency?

Energy efficiency has become a pillar of the new United Nations Sustainable Development Goals (SDGs). The SDGs recognize the cross-cutting importance of buildings and cities in achieving global objectives related to sustainable energy and infrastructure. Better buildings can also make significant contributions to addressing climate change, one of the other SDGs, a point that is further acknowledged in the more than 45 new national climate plans that include building efficiency components. In recognition of the important role it must play in ensuring that countries meet their emissions reduction obligations, last year's UNFCCC Conference of the Parties (COP21) in Paris dedicated an entire day to the building sector. This event concluded with the launch of the Global Alliance for Buildings and Construction, an alliance of organizations collectively committed to ensuring that the global building sector will follow the "below 2°C path".

For more information about ISO and energy, see our brochures:
www.iso.org/iso/energy.

For example, the energy performance of buildings can be calculated using ISO 16346:2013, *Energy performance of buildings – Assessment of overall energy performance*. Complementing it are several other ISO standards that can be used to calculate the thermal properties of the building envelope (walls, roof and basement) and of the individual construction materials. These provide the reference for expressing performance in trade documents and building regulations all over the world.

Holm asserts that while the construction sector has historically been quite a national sector, it is gradually becoming more international. "Building suppliers are increasingly operating in different countries, and suppliers and constructors are also much more international themselves now," he says.

With national governments coming under increasing pressure to maintain low carbon levels, it is encouraging to note that International Standards are being developed, Holm says. "We need this because, overall, the world is becoming more international and this includes the construction sector as well. Multiple standards are difficult to cope with; if you do a calculation with one standard or another, your result may not be the same."

Furthermore, he adds, "standards reduce cost, make our buildings environmentally friendly and increase the comfort inside our buildings." By cutting energy bills and retrofitting costs, they guarantee a healthier, more energy-efficient environment and increase people's well-being.

Constructing sustainably

The Institute of International Harmonization for Building and Housing (IIBH) plays a critical role in efforts to support the development of the building and housing sector in Japan, not only through international harmonization of engineering, system, standards, and codes, but also through international exchange actions such as research and support.

Japan is already one of the world's most energy-efficient countries thanks to efforts by the government and private companies. These days, the country has cutting carbon in its sights. The big challenge, says Nishino Kanako of the IIBH, is to outline the key actions required to transform how buildings are constructed. While transparent and scientific knowledge will offer improved performance and greater economic viability, Nishino recognizes that "there has not yet been such a situation in any part of the world".

She acknowledges that much more can be done to aggressively pursue effective building codes and deep renovation programmes. "For strict policies, it is indispensable for society to obtain credible, reliable and effective tools for evaluating real building energy performance, which are supported by standards."

According to Nishino, harmonization between national and international standards is critical. "The development of standards or any other tools should be reflected in International Standards. This is why IIBH is involved in International Standards development," she says.

Cutting-edge solutions

Of course, any conversation on energy-efficient buildings has to include a discussion on new innovations and methods. For example, the role of energy simulation tools is a big issue for the Norwegian Home Builders' Association.

According to Lars Myhre, the Association's Technical Director and Chair of ISO/TC 163, *Thermal performance and energy use in the built environment*, subcommittee SC 2, *Calculation methods*, energy simulation software tools that engineers, architects and researchers use to model energy consumption are key. "I see a big potential for using information from building information models (BIM) in the energy simulations – for heating, cooling, ventilation, lighting, and plug and process loads – and water use in buildings." In Norway, we have started using BIM when simulating the energy performance of residential homes which is very promising. Personally, I am looking forward to using the new standards being developed by ISO/TC 163/SC 2 to calculate and assess the energy performance of new 'nearly zero' buildings."

Myhre believes it is imperative that we act now. "To avoid dangerous climate change, it is absolutely urgent to improve energy efficiency and reduce emissions of climate gases. The Paris agreement at COP21 confirms this urgency (see Sidebar on page 11)." He, too, goes on to say that standards can make a significant contribution. "Standards are crucial as they give a comprehensive and common framework for calculating the energy performance of single components as well as whole buildings. Using the standards, it is possible to assess alternative measures to improve the energy performance of all types of buildings."

Going holistic

Helping to decarbonize the building sector is the goal of the new holistic approach being developed by the ISO joint working group on the energy performance of buildings (EPB) co-convened by Dick van Dijk and Prof. Essam E. Khalil. For them, it all comes down to the comprehensive method of assessing energy performance as the total energy used for heating, cooling, lighting, ventilation, domestic hot water and, in some cases, appliances.

Van Dijk and Khalil explain that, with the ISO 52000 series of standards under development, the building

industry is expected to be much better positioned to attain energy efficiency improvements with the best available technology and practice. They say that "the ISO 52000 series of standards will enable us to assess the overall energy performance of a building. This means that any combination of technologies can be used to reach the intended energy performance level, at the lowest cost".

The ISO 52000 series, which is expected to be published in the first half of 2017, is being developed in close collaboration with the European Committee for Standardization (CEN) and other standards organizations. In Europe, the EPB standards are being developed to support national implementation of the Energy Performance of Buildings Directive (EPBD).

Differences in national and regional climate, culture and building traditions, as well as policy and legal frameworks, are taken into account by the EPB series, explain van Dijk and Khalil. "Different options are given for procedures, input data and boundary conditions. For each option, a clear template is provided that can be used to tailor the energy performance assessment to a specific situation. An informative ('default') set of choices is also suggested."

Van Dijk and Khalil explain that the holistic approach is a promising one. "Countries using the approach for several years – take, for instance, the Netherlands – have experienced large-scale implementation and cost savings on a variety of new technologies," they enthuse. This includes thermal insulation concepts, windows, heating, cooling, lighting, ventilation or domestic hot-water systems, building automation and control, and renewable energy sources.

For today and beyond

If there is an upside with the world's rabid consumption of housing, it is the potential to quickly turn sustainable buildings into a sustainable business. Improving energy efficiency in buildings will not only provide a significant contribution to stalling the rise in global temperatures, but is also a business opportunity for growth. This includes social and economic factors such as creating jobs, improving health and productivity, improving utility capacity management, and reducing pressure on public budgets.

International Standards
will be needed in order to
develop new concepts and
technologies as well as monitor
and evaluate progress.

Macroeconomists have stated that energy efficiency is the surest energy supply that exists. According to the IEA report, *Capturing the Multiple Benefits of Energy Efficiency*, harnessing economically viable energy efficiency investments would facilitate a more efficient allocation of resources across the global economy, with the potential to boost cumulative economic output through 2035 by USD 18 trillion – larger than the current size of the economies of North America combined.

Of course, with climate change looming large, there are challenges ahead. However, van Dijk and Khalil believe that clear and consistent policy targets play an important role in driving innovation in the building sector. "International Standards will be needed to harmonize the terms, definitions, assessment procedures and indicators in order to develop new concepts and technologies as well as monitor and evaluate progress."

Every step that is taken to reduce environmental impact throughout a building's life cycle – particularly International Standards – is a step in the right direction. For in the words of philosopher Henry David Thoreau: "What good is a house, if you haven't got a tolerable planet to put it on?" ■





YEARS ON

Did ISO 50001 live up to its promise?

by Maria Lazarte

ISO 50001 is under revision after its first five years of service. But as the energy management standard that held so much promise for a clean energy future enters this new stage, the time is ripe to ask the question: “How has it done so far?”

“Last year the world set two new records – global investment in renewable energy was the highest ever, and, for the first time, more than half of the world’s new electric capacity came from clean sources.” Those were the words of US President Barack Obama, delivered via a video recording to the audience of energy ministers from around the globe at the 2016 Clean Energy Ministerial (CEM) in San Francisco, USA.

That was the good news. President Obama went on to warn that we are treading an alarming threshold when it comes to global temperatures. “We have to accelerate our transition to the clean energy of tomorrow,” he admonished, drawing attention to last year’s COP21 climate change conference in Paris where, together with 19 other countries, the US announced a new goal to double its clean energy research over the next five years.

The world is ready for change. In September 2016, Chinese President Xi Jinping made history when he ratified the Paris Agreement signed at COP21, a move followed suit by the US – the two biggest emitters of greenhouse gases. But as President Obama recognized at the CEM, this is a goal that governments cannot achieve alone. Business

leaders have a role to play; individual companies can make a powerful contribution to addressing the energy challenge in their day-to-day activities. It helps, of course, when these actions also benefit the company’s bottom line.

A strategic tool

The benefits of ISO 50001 are twofold. On the one hand, it can help us cut our carbon dioxide (CO₂) emissions. Increased adoption of ISO 50001 could mean a reduction of CO₂ emissions equivalent to removing 215 million passenger vehicles from the road by 2030. On the other hand, adopting the standard makes business sense, with predicted energy savings of USD 600 billion (62 exajoules) over that same period.

It’s no surprise, then, that many countries see ISO 50001 as a strategic tool towards a sustainable energy future, making the standard an integral part of their energy policies. And governments are being proactive, using tax rebates, access to research funding and other incentives to mobilize companies to use it. The CEM, for example, gave rise to an initiative to clock up “50 001 certifications” to ISO 50001 by 2020.

对气候变化在行动

CLIMATE RESPONSE IN ACTION

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JOINING THE PARIS AGREEMENT

HANGZHOU CHINA 3 SEPTEMBER 2016



US President **Barack Obama**, President **Xi Jinping** of China and United Nations Secretary-General **Ban Ki-moon** exchange greetings at the conclusion of a climate event at West Lake State House in Hangzhou, China, in September 2016.

Winners all round

The support is clearly there but, five years on, has the standard lived up to the hype? First, let us start by looking at what ISO 50001 is – and, more importantly, what it isn't. By the time work on the standard began in 2008, energy management was no longer a revolutionary concept. The world was dawning to the fact that “yes, we need energy”, but climate change and the limited supply of fossil fuels made sustainability a key priority. Several countries had already developed their own energy management system standards, so there was an urgency to have a single International Standard that met the needs of increasingly global companies. ISO 50001 offers organizations a framework to integrate energy efficiency into their daily operations. Its guidance can be used to secure resources for business continuity and resilience, adapt to change, and be ready for volatile energy prices and unconventional and intermittent energy resources. Above all, ISO 50001 empowers individual organizations. “Living in a world of uncertainty, companies cannot control prices, government policies or the global economy, but they can improve the way they manage energy,” says Roland Risser, Chair of ISO technical committee ISO/TC 242 on energy management that developed the standard. “The benefits are obvious: better use of resources and assets and less costs and consumption. Not to mention the added bonus of letting the world know that they are helping to make our planet a more sustainable place. We all win.”

It's time to take
stock of what
still needs to be
improved.

A culture of efficiency

The figures are there to prove it. Cummins, a company involved in power generation productions, saved over USD 3 million annually using ISO 50001, while Korean chemical company LG Chem reduced its energy consumption by 10% and costs by USD 9 million. These are just two examples among many similar success stories with impressive results.

A programme led by the US Department of Energy, for example, demonstrated that ISO 50001 not only increased energy savings, but facilities using the standard outperformed those that didn't by up to 65%. And this is not just true of developed countries; Mexico's National Programme for the Sustainable Use of Energy (PRONASE) is expected to result in savings of 25% in electricity and 37% in natural gas over two years.

The first five years of ISO 50001 have consistently delivered savings of between 5% and 30% of current energy costs. Brazilian electric and power company WEG was among the first to adopt the standard in its country. “Energy management made sense,” said João Alfredo Silveira, Manager, Department of Training and Continual Improvement at WEG. “We had already put some effort into efficient equipment, so for us the greatest ISO 50001 benefit was that it helped our employees to become aware of the importance of saving energy at every step. It helped us introduce a culture of energy efficiency.”

In WEG's case, employees are really part and parcel of the success. For energy management to work, they need to believe in what is being accomplished. “This starts with the clear definition of policies, procedures and goals, which are then consolidated by training and qualifications. Once that's done, your people will make things happen,” concludes Silveira. The gamble has paid off, with WEG reporting a reduction in electric energy consumption of 17% on test laboratories and 13% on production assembly lines.

The simpler, the better

While the overwhelming conclusion is that ISO 50001 works, it's time to take stock of what still needs to be improved as the standard undergoes its first periodic revision. For Risser, the biggest challenge is keeping the standard user-friendly and straightforward.

A company involved in power generation productions saved over USD 3 million annually using ISO 50001.



HOW ISO 50001 HELPS TO IMPROVE ENERGY EFFICIENCY

Every year, more and more companies are using ISO 50001 to enhance their energy management.

BENEFITS FOR COMPANIES

-  Save money
-  Conserve resources
-  Tackle climate change

ISO 50001 is just one of many ISO standards that will help ensure access to affordable, reliable and modern energy for all **by 2030**

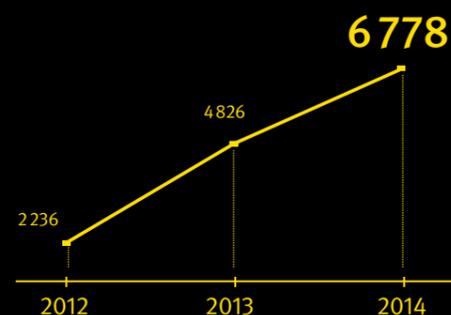
95% of users said the standard helped them identify the activities that consume the most energy

ISO 50001 helps reduce carbon emissions and limit the rise in Earth's temperature to below **2°C**

89% of organizations that have put in place an energy management system and obtained certification are satisfied

9 out of **10** users strongly recommend ISO 50001

INCREASE OF ISO 50001 CERTIFICATIONS



Watch our video on YouTube by scanning the QR code:



Efficiency is becoming critical for sustainability in an increasingly energy-intensive economy.

“It’s simple. It’s flexible. It brings results. ISO 50001 has worked well up until now because organizations know that they are not engaging in a cumbersome process.” Of course, this doesn’t mean it should not be revised, he says. “As we work to take this standard to the next level, we need to ensure that we only add new topics that cost-effectively deliver real results. This is the single factor that will keep organizations motivated to adopt the ISO standard.”

One of the changes Risser foresees in the new edition is better integration with ISO 9001 and ISO 14001. “That’s a trend we are seeing with various ISO management systems standards (MSS). It means less focus on procedures and a drive towards common tools, terms and processes across organizations,” he says. “But let’s not forget that ISO 50001 is unique among ISO MSSs in that continual improvement has a dual focus: the management system itself, as well as energy performance.”

For Risser, this is what makes ISO 50001 a powerful tool to help countries meet the commitments of the Paris Agreement. The standard continually challenges organizations to deliver greater energy savings, while ensuring these gains are sustained in the long term. Even organizations with mature energy efficiency programmes can still improve by 10% or more after using ISO 50001.

Our world, our future

Another question that people will ask during the revision is how well it addresses the needs of developing countries. For Silveira, the biggest challenges these countries face are in terms of competitiveness and productivity. Energy efforts have to help meet these challenges. For a company that already sees the benefit of reducing energy, ISO 50001 can take it to the next level,

by harmonizing and driving efforts. But for those who haven’t taken the leap yet, it can be eye-opening. “For WEG, energy efficiency has actually become one of its great competitive advantages,” says Silveira.

Zhou Lu, Vice-President of certification body CTI-Cert in China, has helped many Chinese companies use ISO 50001. He says the standard has helped them to establish an energy-saving culture in the organization. “ISO 50001 helps you pay more attention to energy costs and investment, make savings and focus on energy meter and data management. They don’t even need to invest in complex solutions, but simply find more efficient ways to handle the every day. Just making sure to turn the light off when nobody is in the room makes an impact in the long term.”

According to Zhou Lu, there is a lot of interest from the Chinese government to push efficiency onto the agenda, as it is becoming critical for sustainability in an increasingly energy-intensive economy. But there are challenges. Results don’t happen overnight, which means some organizations may become impatient. He believes that increasing the value and recognition of certification can drive further adoption. “We want more people to learn about ISO 50001, and to use it, because this can really make an impact, not just to companies, but to our future,” he concludes.

For President Obama, the challenges presented by climate change affect us all. “To address this threat with the urgency it deserves, we have to do more together. Above all, we have to trust each other and push one another,” he urged in his video message. “There is only one way to solve a problem that threatens all of us and that is by working together. There’s nothing more important than the world we leave to our children.” ■



Some of the world's energy leaders assembled for CEM7 in San Francisco, California.

Clean Energy Ministerial focuses on ISO 50001 for low-carbon development

The Clean Energy Ministerial (CEM) is currently the only regular meeting of energy ministers from 24 participating countries and the European Commission, which exclusively discusses clean energy. In 2016, the seventh edition of the CEM demonstrated tangible follow-up action to COP21... using ISO 50001.

At the seventh Clean Energy Ministerial (CEM7) held in June 2016 in San Francisco, USA, world energy leaders announced ambitious actions to accelerate the global transition to clean energy. These actions include efforts to address energy efficiency using ISO 50001 on energy management systems. This year's participants comprise energy ministers, global business leaders, entrepreneurs, experts from laboratories and academia, and leaders from civil society organizations to discuss barriers to progress and identify potential solutions to energy challenges.

CEM7 also recognized the winners of the 2016 CEM Award of Excellence in Energy Management, an international competition that rewards companies successfully using ISO 50001. The Award is an initiative of the Energy Management Working Group (EMWG) at the Clean Energy Ministerial, which seeks to accelerate broad use of ISO 50001 in industry and commercial buildings.

The results of the Award Programme underscore the strong climate and business benefits of investing in energy efficiency. Participating companies reported annual energy cost savings of up to USD 13.5 million and annual greenhouse gas emission reductions of up to 238 000 tonnes of CO₂, equivalent to taking 51 000 passenger vehicles off the road per year.

To get a better idea, we spoke with Graziella Siciliano, Coordinator of the EMWG at the Clean Energy Ministerial. Here, she shares the efforts being made to accelerate broad use of ISO 50001 and the benefits of its wide adoption around the world.

ISOfocus: The winners of the CEM Energy Management Leadership Award Programme were recognized at CEM7. What can you tell us about them?

Energy management systems that meet the global ISO 50001 standard are delivering energy, economic and sustainability benefits to businesses, communities and the world. We salute all of the industrial and commercial facilities that entered this competition. Collectively, they are building a resource to help facilities of all types and sizes understand this cost-effective approach to improve energy performance and reduce carbon emissions.

The Award of Excellence in Energy Management recognizes not only savings but also organizations' efforts to transform the way they are using energy.



Now is the time
– post-COP21 –
to better position
ISO 50001.



Photo: IISD/ENB/Franz Dejon
 From left : The three winners of the CEM Energy Management Leadership Award are **Yoo Jaejoon** of LG Chem Ltd, **Jennifer Rumsey** of Cummins Inc. and **Andrew Cooper** of New Gold Inc.

Broad implementation
 of ISO 50001 could
 drive significant
 energy savings.

ISO 50001, and collaborate internationally according to the key principles above for the robust and consistent implementation of ISO 50001 globally.

What are some of the ongoing obstacles to energy efficiency improvements worldwide ?

Despite clear benefits and favourable payback periods, energy efficiency opportunities remain untapped. The overarching problem is that energy efficiency is not integrated into daily management and operational practices. Most energy efficiency in facilities or buildings can be achieved through changes in how energy is managed, rather than through new technologies. Effective energy management can lead to more efficient energy use without reducing production, quality or employee morale, and without compromising safety and environmental standards.

ISO 50001 is the international best practice for energy management; however, companies need access to qualified professionals to maximize impacts. The most effective ISO 50001 professionals possess a highly specific blend of education, skills and experience with energy efficiency projects as well as with business management systems and procedures. Currently, there is a global shortage of professionals with both of these critical skill sets to support widespread adoption of ISO 50001.

Building global ISO 50001 expertise is one the EMWG's top priorities. The EMWG facilitates collaboration to develop and diffuse professional credentials for ISO 50001 experts and an understanding of the training required to prepare professionals for certification.

As the EMWG coordinator, what, in your view, are the benefits of international collaboration with ISO ?

Standards have a critical role in helping meet climate goals. They create a level playing field and provide transparency, reliability and accountability. The international ISO 50001 energy management systems standard is a key example. Broad implementation of ISO 50001 across the commercial and industrial sectors globally could drive significant energy savings of approximately 62 exajoules by 2030, saving over USD 600 billion in energy costs and avoiding 6 500 metric tonnes of CO₂ emissions¹⁾.

The projected annual emissions savings in 2030 are equivalent to removing 215 million passenger vehicles from the road. Now is the time – post-COP21 – to better position ISO 50001 as a key mechanism for engaging large-energy users on national and international energy and climate goals. Strong international cooperation focused on implementation of the ISO 50001 family of standards and guidance contributes to the dissemination of best-practice approaches, and enables robust and consistent outcomes. ■

This year's top winners include :

- **Cummins Inc.** With nine ISO 50001-certified sites across India, the UK and the USA, Cummins designs, manufactures, sells and services diesel engines and related technology around the world. Establishing an energy management system through a corporate enterprise approach has helped the company exceed savings goals in cost, energy and carbon emissions.
- **LG Chem Ltd, Ochang Plant.** LG Chem is the biggest manufacturer of large-sized polarizers in the world market and makes many kinds of batteries, including lithium-ion batteries. LG Chem's Ochang plant is certified to ISO 50001, helping the company meet domestic and international energy and greenhouse gas targets, including the Korean government's goal to reduce national carbon emissions by 30% by 2020.
- **New Gold Inc., New Afton Mine.** New Afton is the first mine in North America to implement ISO 50001. With lower gold and copper prices over the past few years, improved energy performance is one of the few areas that can improve profitability. ISO 50001 also aligns well with energy and greenhouse gas emissions protocols, allowing the mine to focus on ISO 50001 as a means to comply with several programmes at the same time.

The 2017 award programme is already underway, with submissions due on 24 January 2017. ISO 50001 benefits organizations large or small in any sector, so we hope to

receive a broad range of entries to showcase successes across a broad range of organizations where ISO 50001 is creating change – commercial and industrial facilities, municipalities, hotels, airports, universities, and more.

What actions are being taken by the EMWG to accelerate the adoption and use of ISO 50001?

The ISO 50001 standard is a framework to help companies manage and continually improve their energy performance and realize cost and emissions reductions. Regardless of a company's size or sector, this framework helps achieve energy and cost savings year after year. In addition, the standard is a product of international collaboration, drawing on best practices from over 50 countries.

EMWG member countries collaborate to build domestic capacity to accelerate adoption of ISO 50001. The 16 member governments, and critical partners such as ISO and the United Nations Industrial Development Organization (UNIDO), take part in peer sharing and support the definition of solutions for governments to expand and enhance national policies and programmes.

To broaden the reach and impact of ISO 50001, the EMWG launched the Energy Management Campaign at this year's Clean Energy Ministerial (CEM7). This campaign aims to achieve 50 001 global certifications to ISO 50001 by 2020. In pursuit of this goal, the EMWG and campaign partners are recruiting government, industry and other stakeholders to make tangible commitments to accelerate investment in



1) "Analysis of Global ISO 50001 Savings Potential through 2030", Energy Management Working Group, Paper Release Date – July 2016

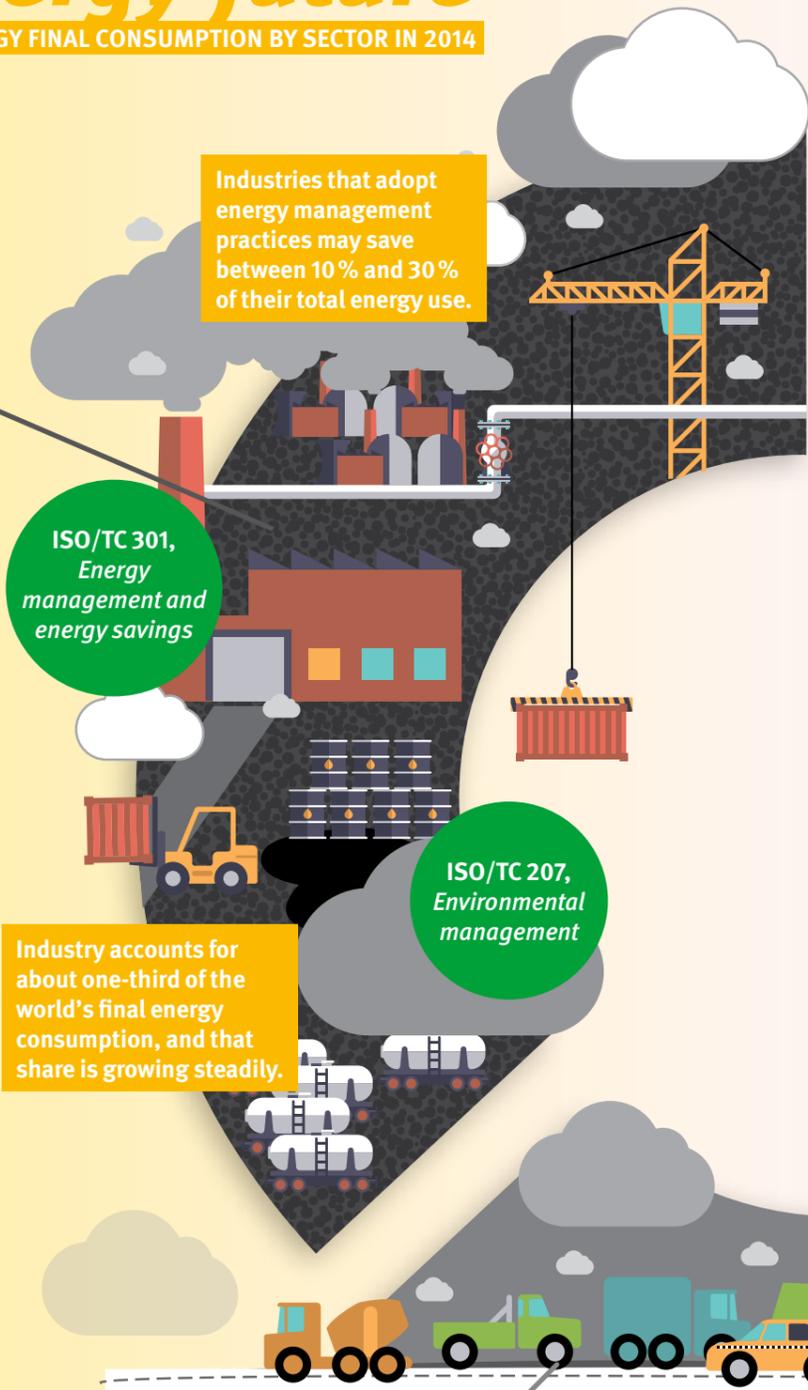
SOLUTIONS for a clean energy future

TOTAL ENERGY FINAL CONSUMPTION BY SECTOR IN 2014

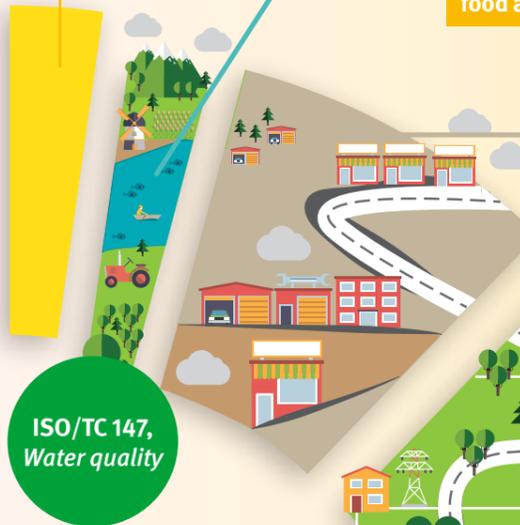
INDUSTRY
37%

The carbon intensity of the global economy can be cut by two-thirds through a diversified energy technology mix. ISO standards hold part of the solution, helping to use energy more efficiently, reduce carbon emissions and improve the quality of life around the world.

TRANSPORT
28%



OTHER
2%



PUBLIC SERVICES AND COMMERCE
8%

By 2050, rooftop solar could technically meet one-third of cities' electricity demand.

ISO/TC 205, Building environment design

ISO/TC 180, Solar energy

Air sealing alone can reduce the need for heating by 20% to 30%.

ISO/TC 22/SC 37, Electrically propelled vehicles

One billion electric vehicles are needed on the road by 2050 to achieve the 2°C global warming target.

ISO/TC 23/SC 18, Irrigation and drainage equipment and systems

Access to modern energy leads to higher yields and increased food availability.

Reduced use of fossil fuel in agri-food systems has a positive effect on economic returns of food production over time.

AGRICULTURE AND FORESTRY
2%

ISO/TC 265, Carbon dioxide capture, transportation, and geological storage

ISO/TC 163, Thermal performance and energy use in the built environment

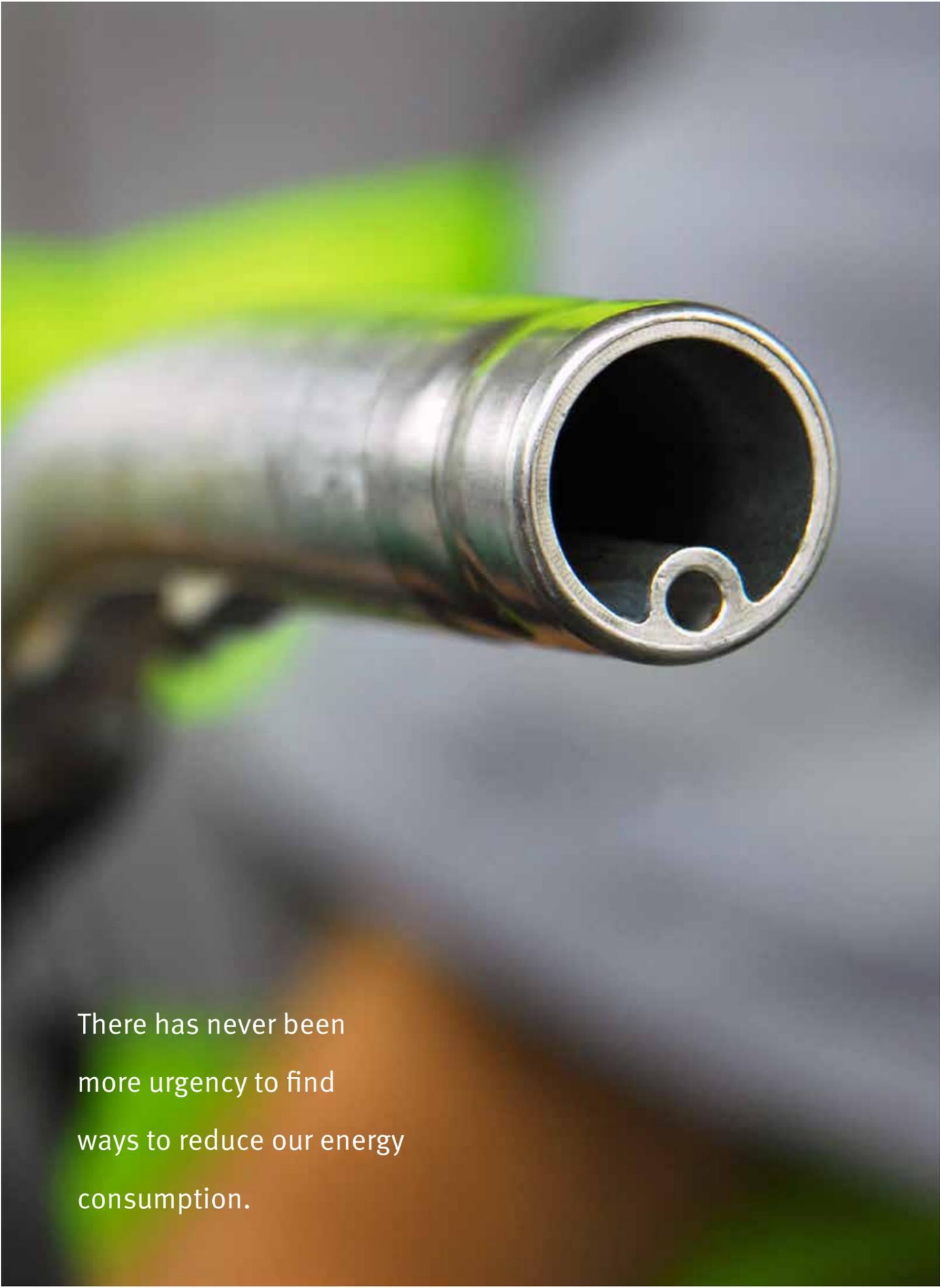
Buildings are the largest energy-consuming sector in the world, accounting for over one-third of total final energy consumption.

RESIDENTIAL
23%

ISO/TC 285, Clean cookstoves and clean cooking solutions

Some 3.5 million premature deaths are due to the use of biomass for cooking and kerosene for lighting.

More than 3.9 billion people – 54% of the global population – live in urban areas, accounting for around 80% of global economic activity.



Fighting the fossil fuel challenge

Energy efficiency is one of the most effective ways of tackling climate change. But with energy consumption on the rise, what can be done? Here, Brian Motherway, Head of Energy Efficiency at the International Energy Agency (IEA), tells us how standards are essential tools in driving our use of energy down.

World energy production is at its highest ever. Total energy consumption around the world has more than doubled in the last 40 years and is expected to increase even further, up to 30% by 2030. What's worse, the use of fossil fuels, while declining, still accounts for 81% of global energy production.

But reducing energy use, and being more energy-efficient, is one of the surest ways of reducing greenhouse gas emissions, and thus halting the rise in the earth's temperatures and all the climate change havoc that ensues. In addition, it can save us a lot of money! The European Union (EU) estimates that implementing measures such as minimum energy performance requirements on products worldwide and harmonizing those measures globally could result in up to EUR 410 billion in energy savings by 2030.

There has never been more urgency to find ways to reduce our energy consumption, and global organizations like the International Energy Agency (IEA) are leading the way in promoting energy efficiency measures and policies in countries around the world. We talk to Brian Motherway, Head of Energy Efficiency at the IEA, about how standards

are helping to implement such initiatives in the race against the climate change clock.

ISOfocus: Why do we need to be concerned about energy use?

Brian Motherway: We need to address the challenges associated with our energy use, from climate change to energy security to urban air pollution. The changes that are needed, led by energy efficiency and switching to renewable sources, are things that can't have been quick to change in the past. That's the key challenge – transition is required at a scale and pace that are unprecedented.

At COP21, 164 countries set renewable energy targets to reduce greenhouse gas emissions. Isn't this a step in the right direction?

COP21 was a major step forward and the extent of societal commitment has never been stronger. But it doesn't yet deliver the full decarbonization path – that is reducing our greenhouse gas emissions – that we need. More action is required, and that is led by improving energy efficiency and using more renewable energy.

There has never been more urgency to find ways to reduce our energy consumption.



Photo: IEA

Brian Motherway, Head of Energy Efficiency at the International Energy Agency (IEA).

International Standards give confidence to make the right decisions.

Leading with energy efficiency makes the task easier and cheaper. According to a recent study commissioned by the Climate Works Foundation, putting energy efficiency to the front of the agenda will reduce the total societal costs of decarbonizing the energy system by USD 2.5 trillion between now and 2030. It is clearly the direction we need to head.

Where do we stand in terms of energy efficiency measures and what is already being done?

Energy efficiency is the “first fuel” in the global energy system and the most important action governments must take to transition to a sustainable energy system. To monitor progress, the IEA’s Energy Efficiency Market Report tracks the core indicators of energy efficiency. Questions addressed in this year’s report include: Are we improving energy efficiency fast enough to achieve our climate goals? Which countries and policies are having the greatest impact and what is the secret to their success? How are low-energy prices impacting energy efficiency investments? What are the multiple benefits of energy

efficiency for the climate, energy security and public budgets?

The latest report finds that in 2015 over USD 220 billion were invested globally in energy efficiency and that the impacts of energy efficiency on national trade deficits are significant. Energy savings reduced total import bills across the 29 IEA member countries by at least USD 56 billion in 2015. Energy imports constitute one of the largest sources of trade deficit in many IEA countries. In 2015, the EU spent USD 270 billion on energy imports, which was the single largest imported good in the region.

The report also found that energy efficiency improvements since 2000 have saved an estimated 1575 TWh of electricity consumption in 2015, which is 15% of total electricity generation in 2015 in IEA countries. To put that in perspective, had electricity consumption been 15% higher in 2015, an additional 580 GW of new generation capacity would have been needed in IEA countries, entailing additional investment of USD 1170 billion.

This is being driven by a strong increase in the use of energy efficiency standards and regulations. In 2015,

mandatory energy efficiency policies (performance standards and mandatory targets) covered 30% of the world’s energy consumption, up from just 11% in 2000.

What more needs to be done and how can standards play a role?

New patterns of investment and new behaviours are required. Certainty and confidence are essential in achieving this, to empower consumers to make better purchasing decisions and to encourage banks to invest in more energy-efficient solutions. Governments, too, need certainty when embarking on new policies that encourage more efficient use of energy. This is where standards come into play, because they instil that certainty and confidence.

Standards are already making a large global impact, for example when used for minimum energy performance of appliances and other products. While national standards are often effective, they are even more so if they are internationally harmonized, as International Standards give confidence to make the right decisions. This not only ensures there is consensus on how energy performance is measured, but also benefits consumers and trade.

But there is still a great deal of potential for standards to further reduce energy consumption. For example, in transport, the application of vehicle efficiency standards currently means that total global oil use is over two million barrels per day, or 2% less than it would otherwise be.

However, if such vehicle efficiency standards were expanded to all countries and the standard performance levels increased at a rate equivalent to the best-performing current standards, oil savings could double to over four million barrels per day. Likewise, if best-in-class energy performance standards were applied to all buildings, 14% of global residential energy consumption could have been saved in 2015. There is also a role that standards can play in the growth of new investment. New models such as dedicated green bonds will benefit from clarity and certainty in their rules and definitions.

And finally, when it comes to investing in new technologies for energy efficiency, there is a need by governments and investors for confidence that it will actually bring a return. That is where standards also play a vital role. Energy efficiency is all about building awareness and confidence in its ability to deliver. ■



FRANCE CELEBRATES 90 YEARS OF STANDARDIZATION

AFNOR, ISO's member for France, celebrated its 90th anniversary during ISO General Assembly week in Beijing, China, alongside several Chinese officials, customers of AFNOR Group and representatives from its China office. ISO President Dr Zhang Xiaogang and guests were able to appreciate the progress of the organization since its creation on 21 June 1926. Originally established to draw up a common nomenclature for industrial manufacturing standards, AFNOR is now a 1 200-person-strong international service group and coordinator of the French standardization system. It continues to fulfil its mandate through its organization, which was officially recognized of public interest by governmental decree in 1943. The NF mark, a certification used to assess an organization's compliance with a standard, was created that same year. The first NF marks pertained to fire safety equipment, lime and cement, reflecting the country's reconstruction post World War II – today, there are more than 450 NF marks for products and services. Olivier Peyrat, Managing Director of AFNOR, said: "Since becoming a founding member of ISO in 1947, AFNOR has continuously supported efforts of France's socioeconomic stakeholders to engage in standardization. Today, their vibrancy has positioned France among the top five most active countries."

THE BIG HACK

What would happen if standards didn't exist? What if, suddenly, all standards disappeared? Bridges wouldn't open, stop signs wouldn't work, water taps would harbour all sorts of dangerous bacteria... There would be total chaos! In this app game, all standards in the Netherlands have been hacked. We need a NEN-hero to help fix the standards and bring the country back to normal.

NEN is celebrating its centenary in 2016. For ISO's member in the Netherlands, this was a fantastic opportunity to do something entertaining that would reach people in a fun way and bring them into contact with standardization. So it came up with a quiz concept focused on young people from ages 12 to 17, although the game is fun for everyone from 12 to 120!

The game guides you through four missions. First, the hero has to complete a special training at the NEN headquarters. Then he proceeds by trying to fix standards at home, on the road and at work or school. You can earn points by answering multiple-choice questions and play mini-games by swiping. Make sure you complete the tasks in time! Try and get to the top of the leaderboard by answering correctly and quickly.



The NEN-game "De Grote Hack" is now available in the App Store, Play Store and Windows Store.



BBSQ TAKES UP ITS MANDATE

The Bahamas Bureau of Standards and Quality (BBSQ) was officially launched in May 2015, endowing the formerly named Bahamas Bureau of Standards with a quality unit. This was a landmark moment reflecting recognition by the Bahamian government of the need to have a requisite standards infrastructure to support and promote a culture of quality.

Dr Renae Ferguson-Bufford, Director of BBSQ, said the Bureau would continue to work to improve the quality of goods and services imported, exported and sold within the Bahamas. BBSQ will help the country build its National Quality Infrastructure (NQI), which encompasses all aspects of metrology, standardization, testing, certification and accreditation that have a bearing on conformity assessment.

If the Bahamas is to see continued growth as an emerging market for foreign investment, and export its goods and services to the rest of the world, it must be supported by an effective NQI system that underpins public health and safety, the environment, innovation and free and fair trade. The Bureau is also important in terms of local consumer protection.

Work will begin by improving the labelling of goods and products in response to increasing consumer demand and establishing strong partnerships with relevant sister organizations to align the new Bureau with globally accepted best practice. BBSQ aims to ensure sustained quality living standards for the country as it advances towards greater integration with the world economy.



PERU'S OLYMPICS FOR YOUNG STANDARDIZERS

In April 2016, Peru held its very first National Olympiad for Standardization, which brought together 48 teams from High-Performance Schools in seven regions of the country. Developed by ISO's Peruvian member INACAL on the model of the Korean International Olympiad for Standardization, it aimed to promote awareness among secondary-school children of the use of technical standards in daily life, encourage creativity in students and contribute to the culture of quality in the education sector.

Each of the 48 competing teams was asked to plot a story reflecting the importance of technical standards in everyday life, draft a mock standard that allowed to solve a problem in their community and devise a pictogram expressing an idea that could be understood by any language speaker anywhere in the world. Finally, in the last leg of the contest held in June 2016, finalists had to build a bridge with a proposed guideline for construction. And the winner was... a team from Junín named "Risk Takers". Congratulations!

In the wake of the World Smart City Forum held in Singapore last July, representatives of IEC, ISO, ITU, IEEE, CEN-CENELEC and ETSI gathered for a meeting aimed at accelerating and better aligning smart city standardization work, an essential ingredient for smart city deployment.

With two-thirds of humanity expected to be living in urban environments by 2050, cities need to make better use of resources and become more efficient. In today's metropolises, much of the infrastructure is installed by a diverse set of suppliers and maintained by different agencies that sometimes work in isolation. To connect them both physically and virtually, standardized interfaces need to be put in place that ensure compatibility of hardware and technologies and facilitate data collection/sharing.

Over the coming months, these organizations will work together to develop a viable framework for cooperation to optimize outcomes and reduce duplication, wasted time and expense. A follow-up meeting organized by ISO is planned for 2017.

ORGANIZATIONS UNITE FOR SMARTER CITIES



SPRING'S GOLDEN JUBILEE

In 2016, SPRING Singapore, ISO's member for the country, celebrated 50 years of the Singapore Standardisation Programme, which has led Singapore's quality journey since the first stages of development as an independent nation.

The Gala Dinner was graced by the presence of Mr Tharman Shanmugaratnam, Deputy Prime Minister and Coordinating Minister for Economic and Social Policies, who praised the standards organization for its excellent work and envisioned quality and standards (Q&S) as a key pillar of the country's future economy.

For 50 years, Singapore's robust Q&S initiative has been instrumental in enhancing the country's infrastructures and ensuring its products and services meet the highest international standards for quality and safety, enabling local enterprises to grow and access new markets.

The strategy to make Q&S a pillar of the future economy focuses on four key areas: emerging sectors; industry transformation; extending the reach of the Q&S network through international and regional forums; and developing a Q&S-competent workforce.

How Uruguay became the world's wind powerhouse with standards

MEMBER EXCELLENCE

Uruguay is at the forefront of a growing movement of communities that are transforming the way they generate and use energy. Here, Fernando Gómez, Manager of Standardization at UNIT, explains how his small country became a renewable giant.

As the world came together at COP21 in Paris last December to agree on policies for switching from fossil fuels to renewable energy, one small Latin American country was already making the transition. In 2015, Uruguay announced that, in less than ten years, it had fulfilled almost 95% of its power needs from clean energy – without government subsidies or a rise to consumer costs.

The country once relied heavily on hydropower, but a decade of dry years between 1997 and 2007 drove the hydro share of electricity down from more than 90% to around 50%, leading to an increase in fossil-fuel imports. Today, as you drive along Route 5 from Montevideo to the north, you can spot at least three windfarms in less than 200 miles and wind turbines are making an appearance all over the country. In fact, by mid-2015, Uruguay had installed 581 MW of wind capacity, generating an average 17% of total electricity over the year.

How did this happen in just one decade? The big break came in early 2000 when the government launched

its long-term energy policy, which won cross-party support. This provided the stability needed to kick-start investment in wind turbines, biomass and solar that now account for 55% of the country's energy mix – an honourable figure when opposed to the global average of 12%.

If there's a lesson to be learned from Uruguay's example, it's the importance of strong decision making in the quest for energy efficiency. Fernando Gómez, Manager of Standardization at UNIT, Uruguay's national standards body, explains how his country turned its energy predicament into a huge success story.

Where there's a will...

Despite its relatively small population of 3.4 million, Uruguay was in something of an energy deadlock 15 years ago. By the turn of the 20th century, it had exhausted its options for hydroelectric resources and the growth rate of the economy was making it entirely dependent on imported fossil fuels for its energy needs. This represented a dual problem. On the one hand, it



Fernando Gómez, Manager of Standardization at UNIT.

body, UNIT, the ISO member for the country, to become active in ISO technical committee ISO/TC 255, *Biogas*.

With regard to energy demand, the action plan focused on efficiency. An agreement was signed early on in the programme between the National Energy Agency (DNE) and UNIT for the development of a labelling system and standards for energy-consuming devices. The first energy efficiency standards were for lighting equipment and household appliances, soon to be joined by other devices such as gas appliances, solar heaters, motors, and the like.

The standards setting the framework for the labelling system were heavily based on ISO and IEC international standards to ensure the broadest application possible. For domestic water heating appliances, for instance, our public policies for energy efficiency promote the use of solar water heaters in accordance with standards from technical committee ISO/TC 180, *Solar energy*. But far from being restricted to the sole energy-guzzling equipment, our standards development also targets the use of energy in buildings through the work of ISO's technical committees on design (ISO/TC 205) and thermal performance (ISO/TC 163) in the built environment.

Banking on energy management

Another important driver for energy efficiency in Uruguay was the ISO 50000 series of energy management standards. UNIT was responsible for the Spanish translation of the high-profile ISO 50001, *Energy management systems – Requirements with guidance for use*, and its successful adoption as a national standard (UNIT-ISO 50001), which was launched in the presence of our national authorities, representatives from the ISO Central Secretariat and members of ISO/TC 242, *Energy management*, the technical committee that developed the standard.

UNIT-ISO 50001 is gradually being implemented in the industrial sector and a number of companies, mainly from the more energy-intensive sectors such as the paper pulp and meatpacking industries, have already been certified.

Biofuels are also showing promise in the transport sector and several standards for biofuels have already been developed based on the excellent work of subcommittee ISO/TC 28/SC 7 on liquid biofuels. Future standards on charging networks for electric vehicles are also on the radar and the scope of work is continuously expanding.

Challenges ahead

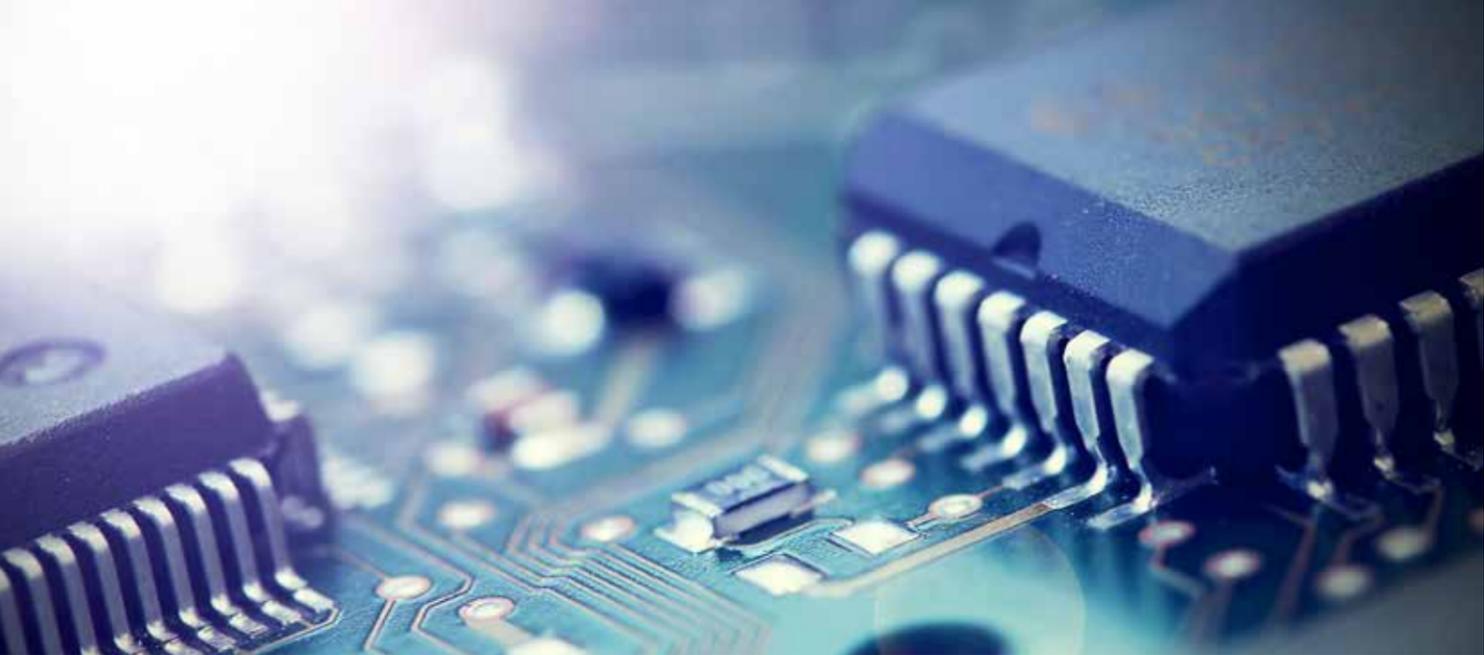
By the end of 2015, we had fulfilled our goal of reducing the oil share in our global energy matrix to below 50%, and in 2016 our electric power is almost completely derived from renewable resources (hydro, wind and biomass). The next milestone will be to save 1.69 Mtep (million-tonne equivalent of petroleum) energy consumption by 2024. There are still many challenges before Uruguay can be deemed to be fully energy-efficient, but these herald as many opportunities for new technical standards to address them. For standards have been, and will remain, a strategic support in the implementation of Uruguay's long-term energy plan – a plan which is already producing very promising results. ■

increased the country's emissions of greenhouse gases, on the other, its hefty oil purchases caused a drain of foreign currencies.

Then, in early 2000, the Uruguayan government adopted a long-term energy plan – the National Energy Policy 2005-2030 – supported by all political parties, with the overall objective of diversifying the energy mix and reducing the country's dependence on fossil fuels. The new policy set four strategic guidelines for energy resilience (institutional, supply, demand, and social), i.e. four focal points on which relevant action plans could be drawn up.

Diverse mix of power

On the supply side, change came in the form of wind turbines, which started to pop up all over the country, and from the concerted use of biomass, mainly in the pulp and paper industry. More recently, initiatives were launched to produce biogas from cattle manure and exploit the methane emissions from municipal solid waste. This motivated Uruguay's national standards



Hitachi runs *big data on low energy*



The shift towards an information-oriented society has meant power consumption by IT equipment has been increasing at an alarming rate. Today's largest data centres are industrial-scale operations, which can use as much electricity as a small town. Guided by its vision for a more sustainable society, the Hitachi Group is working hard to develop energy-efficient products and solutions that reduce the burden of human activities.

The IT landscape is changing fast. With the spread of cloud computing and the use of large quantities of data in recent years, data centres are handling ever-increasing volumes of information. In fact, the total amount of information processed in society is predicted to be 200 times greater in 2050 compared with 2006, requiring even more IT equipment with even larger bandwidths.

In data centres, the IT equipment and other devices must be cooled by air conditioners at all times to stop servers overheating and avoid possible meltdown. Adding more servers to cope with the expanding data will generate even more heat, causing the power consumed by air conditioners to rise as well – and so the cycle goes on.

Committed to reducing the environmental burden of data centres, the Hitachi Group is developing energy-efficient IT products (“Eco-Products”) and solutions that meet the standards for sustainable societies while preserving individual happiness. This has led it to become Japan's first company authorized to display the Carbon Footprint of Products on its IT equipment (servers, storage and network devices).

Contributing to society through the development of superior, original technology and products has underpinned the Group's business development for over a century. *ISOfocus* caught up with experts from the Hitachi Group¹⁾ representing data centres, standards and the environment, to find out how the company remains true to its corporate credo.

1) The experts from the Hitachi Group are Osamu Namikawa, Akio Fukushima, Shinobu Irikura, Yoshito Sakurai, Masaki Ito, Kyoko Tajima and Yasunori Nagaoka.

ISOfocus: In the Hitachi Group Sustainability Report 2015, the company highlights its efforts in using and developing International Standards. Why is this such an important issue for the Hitachi Group?

The issues humanity faces are becoming global in nature. With climate change, the degradation of our ecosystems, the careless use of energy and water resources, food shortages, urban population growth, and the greying of societies, the challenges around can seem insurmountable. As a global corporate citizen, the Hitachi Group creates both economic and social value for a sustainable society. We are responding to these complex issues with new solutions like our Social Innovation Business, which fully integrates our advanced “smart city” infrastructure and information technologies to provide a positive impact on every facet of people’s lives. Implementing social innovation businesses requires new forms of cooperation between

stakeholders, for which our work in International Standards provides the perfect opportunity. We are committed to our standardization activities as a means of facilitating innovation and harmonized solutions that resolve these social issues and support the development of sound global markets and a sustainable society.

Could you please describe the Hitachi Group’s energy efficiency initiatives? In what ways will the ISO/IEC 30134 series of standards help make data centres “greener”?

The Hitachi Group has invested in a range of products and technologies, such as high-efficient air conditioners, low-loss transformers and high-efficient uninterruptible power supply (UPS) equipment, to improve the energy efficiency of its data centres. For example, the Okayama Third Data Centre, launched in 2012, was based on the concept of balancing high-density IT equipment with high-efficiency power consumption.



Photo: Hitachi Group

One notable technology is the Ref Assist²⁾ energy-saving spot cooling system, which reduces the power consumption of air conditioners – a high percentage in the operation of data centres – while increasing space efficiency. We are proud to report that it is referenced in the Recommendation ITU-T L.1300 of the International Telecommunication Union for its space and energy efficiency.

What’s more, to keep track of the energy expenditure in our data centre operations, we have adopted the Power Usage Effectiveness (PUE) metrics advocated by The Green Grid (TGG) consortium of IT professionals, which measure how efficiently a computer data centre uses energy and monitors the impact of its efficiency efforts. The PUE is also a key performance indicator (KPI) in energy-saving legislation in Japan and is defined in ISO/IEC 30134-2.

Our commitment to sustainability earned us The Green Grid’s Grand Prix Award for best data centre in 2010 for our Yokohama Third Centre, which is one of the most robust and reliable in the industry. The temperature, humidity and energy are monitored regularly in the server room and the energy efficiency analysed for potential improvements.

2) “Ref Assist” is a trademark of Hitachi, Ltd.

The ISO/IEC 30134 series of standards has served as an efficient conversation tool with our customers.

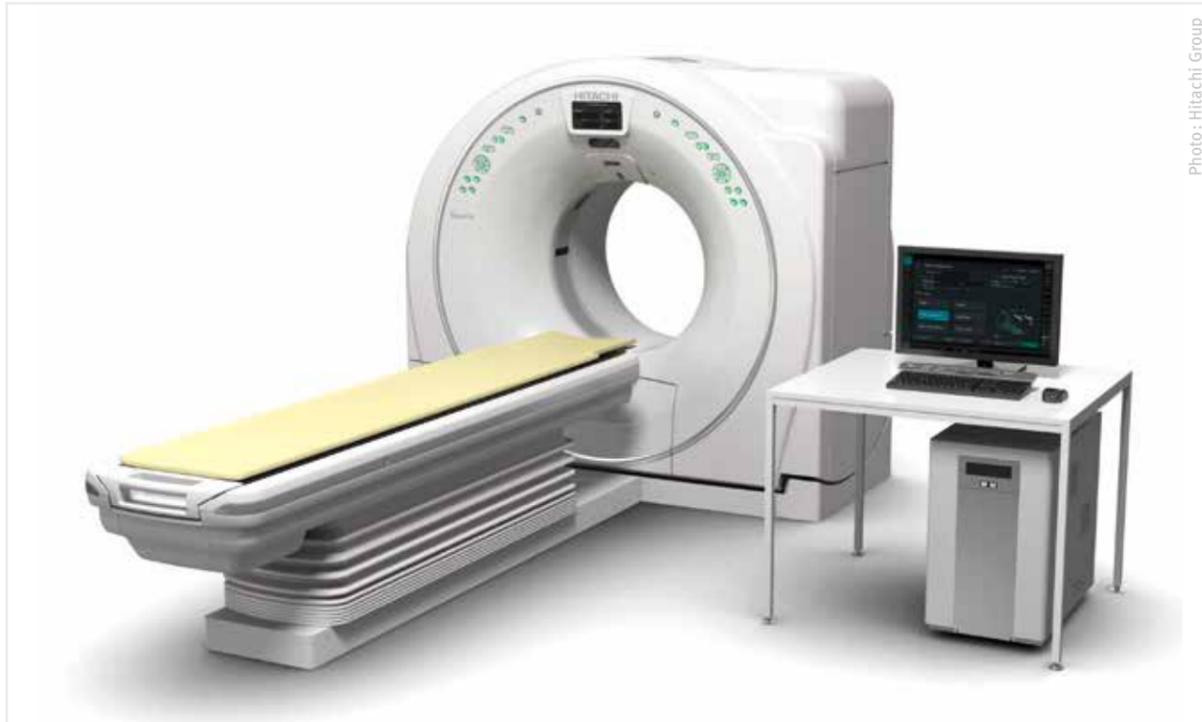


Photo: Hitachi Group

Equipped with 64 rows of X-ray detectors, the Supria 64 CT system scans broad areas at high speed. Compared to its 16-row predecessor released in 2007, the latest model achieves annual power savings of roughly 60% during use.

The Hitachi Group conducts its energy-saving and standardization activities based on 20 years' experience of data centre operations. Today, the Group is leading joint technical committee ISO/IEC JTC 1/SC 39 to get the ITEEsv (IT Equipment Energy Efficiency for Servers) and ITEUsv (IT Equipment Utilization for Servers) – two indicators suggested by Japan – included in the ISO/IEC 30134 series of standards on KPIs for data centres.

What message would you give to companies that have not yet understood the strategic importance of this set of IT standards? What is the business case for their use?

The ISO/IEC 30134 series of standards has served as an efficient conversation tool with our customers in promoting our products and services, because it provides objective efficiency and performance data. This is important to win over people's trust in what we do.

Besides ISO/IEC 30134, Hitachi has taken part in a number of other standards development committees. One recent example is the ISO International Workshop Agreement IWA 18, published in June 2016, which provides a holistic framework for integrated community-based health and care services in aged societies. Here, the word "integrated" includes the efficient use of IT-based integrated platforms

for the reliable collection and sharing of clinical data between health providers.

Hitachi understands that healthcare services using big data will be an integral part of the social infrastructure supporting our 21st-century society. That's why we decided to enshrine our experience and solutions in an official document before the global roll-out of our healthcare information services. IWA 18 is an appeal for stakeholders to resolve one of the prevailing issues of ageing societies by investing in an ecosystem of health and care services. We believe these standard-related activities are indispensable when launching a new venture in societal infrastructure, to get a common understanding of its business sustainability.

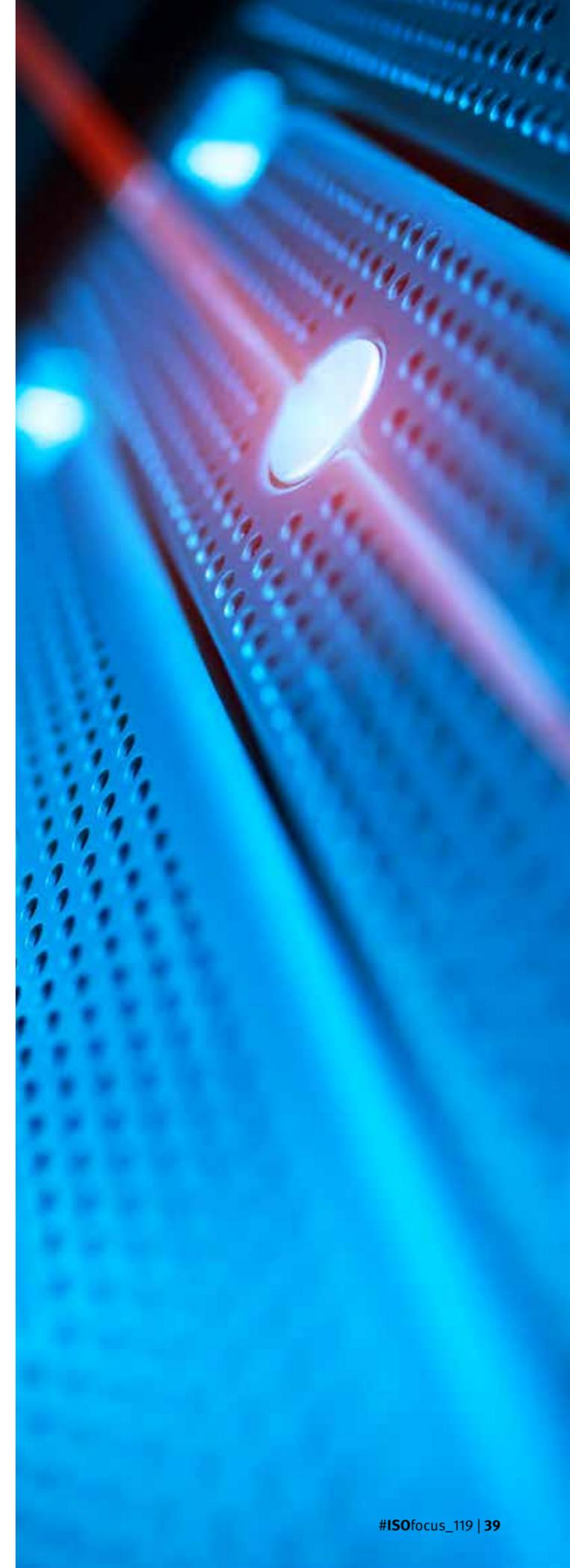
What are some other examples of the Hitachi Group's efforts to reduce the environmental burden of products and services? How do (or can) International Standards contribute to your efforts?

In 1999, we introduced the Assessment for DfE (Design for Environment) in the design and development of our products and services to minimize the environmental burden at each stage of a product's life cycle. Our products and services are designated "Eco-Products" when they meet the eight assessment criteria, including weight

The Hitachi Group conducts its standardization activities based on 20 years' experience of data centre operations.

reduction, resource recycling, energy efficiency and environmental conservation. Examples of such equipment include the Supria 64 CT system and the Package (oil-free) Bebicon Next series of air compressors. Since then, we have continued to expand our products and services in this area – so much so that the percentage of eco-product sales exceeded 95% of total product sales in 2015.

Building on this success, we have now formulated a new Environmentally Conscious Design Assessment based on IEC 62430. Beginning this year, we have submitted all our products and services involving a design process to this assessment and hope the added value of our eco-products will contribute to the growth of our business and the protection of the global environment. Expanding the reach of the standard, IEC 62430 is currently being developed as a joint ISO/IEC standard, without amendments to the original requirements. ■





CREATING A MORE **ENERGY-EFFICIENT WEB**



Google has a long-standing commitment to the environment and energy efficiency. It used ISO 50001 as a framework to establish a more structured and formalized energy management system and achieve recognition for its efforts. Bolstered by the programme's success, the company continues to reduce its energy use and emissions through improved efficiency – leveraging new tools like machine learning – as well as by purchasing renewable power. Here, Laura Franceschini, Program Manager, Data Center Sustainability at Google, examines best practice.

Google's data centres are the engines of the Internet – they power all of our products and services and represent the vast majority of our energy consumption. When you use Google products like Search, Gmail and YouTube, the servers in our data centres do the work for you – around the clock and around the world. We work hard to minimize the environmental impact of our services, so that when you use our products, you're also using less energy.

For over a decade, Google's been designing and building data centres that use 50% of the energy of a typical data centre, and we're always looking for ways to reduce our energy use even further. We've built our own super-efficient servers, invented more efficient ways to cool our data centres and are committed to powering 100% of our operations with clean energy. We've signed contracts to purchase nearly 2.5 GW of renewable energy so far, making us the largest non-utility renewable energy purchaser in the world.

In 2013, Google took its commitment to energy efficiency a step further by becoming the first company in North America to achieve a multi-site ISO 50001 energy management system (EnMS) certificate. We are the only major Internet company to have obtained this certificate, which covers our owned and operating data centres. Google has certified 12 data centres globally, including seven sites in the United States, three in Europe and two in Asia.

Photo: Google



Photo: Google

Google's data centres are the engines of the Internet.

The journey to ISO 50001

When the ISO 50001 standard came out, we saw the framework as an opportunity to establish a more structured and formalized energy management system and gain third-party recognition for our existing energy efficiency efforts.

Much like the environmental and occupational health and safety management systems, to which our data centres are also certified, ISO 50001 is built around a “Plan-Do-Check-Act” concept. This concept ensures we have a strong energy policy, implement processes that strengthen our EnMS, build a sound auditing programme that verifies our EnMS is effective, continually monitor, assess and respond to our energy efficiency results, while always working on ways to make things even better. Based on the requirements in the standard, Google has developed an EnMS that makes sense for our energy culture. This means continuously challenging energy performance goals, improving upon our energy-efficient data centre designs and establishing progressive monitoring systems, to name a few.

When developing our EnMS, we took a lean approach to documentation. We built a streamlined system that consolidated ISO 50001 requirements into only five management system procedures, reducing the amount of time our employees need to spend on paperwork so they can spend more time researching and implementing energy efficiency initiatives.

We also streamlined our internal auditing. Because so much of our energy programme is managed at our corporate headquarters, we created a targeted internal auditing programme for our data centres. It limits the number of on-site data centre internal audits conducted each year by utilizing a self-audit questionnaire at some selected sites. The audit topics are also focused to include only those relevant to data centre activities.

Our EnMS certification audits have never identified any non-conformances, demonstrating that our programme is comprehensive and effective.

Our energy management system

How do we manage energy at Google? We drive down the cost and environmental impact of running our data centres by designing and building our own facilities to best use the natural environment and conditions. We install smart temperature and lighting controls, employ advanced cooling and controls strategies, and redesign how power is distributed to reduce unnecessary energy loss. We build our own custom highly efficient servers and keep them busy, so we can do more with less energy.

We can only improve upon what we measure, so we regularly calculate comprehensive efficiency performance data for each facility. In fact, we were the first data centre operator to disclose detailed energy efficiency data for all of our data centres in 2008, and we've continued to publish this every quarter since then.

Compared to five years ago, we can now deliver over 3.5 times as much computing power for the same amount of electrical power. That means that even though we're sending more e-mails, watching more YouTube videos and saving more digital photos, we're using the same amount of energy.

Driving further energy efficiency through machine learning

In our ongoing pursuit of extreme efficiency, we recently hit upon a new tool to drive our energy use to unprecedented lows: machine learning.

In a dynamic environment like a data centre, it can be difficult for a human to see how all of the variables – IT load, outside air temperature, etc. – interact with each other. To address this, two years ago we began applying machine learning to optimize our data centre operations. We partnered with our artificial intelligence company, DeepMind, to analyse the large amounts of data we gather in the course of our daily operations and build models to recognize patterns and “learn” from them, which enabled us to predict – and improve – data centre performance.

Our machine learning system was able to consistently achieve a 40% reduction in the amount of energy used for cooling, which equates to a 15% reduction in overall

energy overhead after accounting for electrical losses and other non-cooling inefficiencies.

The initiatives we've implemented to date have saved us a billion dollars and we've learned a lot along the way. By outlining our best practices and sharing them via white papers, we are helping other data centres run more efficiently.

Enabling others to reduce energy use with the cloud

We're building the world's most energy-efficient computing infrastructure through our data centres and the gains we're making can benefit anyone. Because of our energy efficiency efforts, our cloud empowers millions of businesses to reduce their energy use too. By switching to Google Apps, companies have reduced office computing costs, energy use and carbon emissions by 65% to 90%¹⁾.

As we continue our quest for energy efficiency, ISO 50001 is one of the tools we will continue to use. We are participating in ISO 50001's technical committee to ensure the standard continues to be a valuable tool for Google and others. ■

1) Google Apps: Energy Efficiency in the Cloud, 2012 white paper



Photo: Google



Photo: Google



Photo: Google



Photo: Google



How ISO standards **connect the world**

There was clear support for the role of standardization in better serving economic trade and social development at ISO's 39th General Assembly in China, which brought together some 400 delegates from more than 120 ISO members.

President Xi Jinping of China underlined how “standards have become the common language of the world” in a written message addressed to some 400 delegates from over 120 member countries at the 39th ISO General Assembly (ISO GA), which ran in Beijing from 10 to 14 September 2016. The message was delivered by Zhi Shuping, Minister of the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) of the People's Republic of China.

“With the deepening of economic globalization, standardization is playing an increasingly important role in facilitating business transactions, supporting industrial development, promoting scientific progress and regulating social governance,” President Xi Jinping said. “Standards have become the common language of the world.”

In his message, the Chinese President pointed out how “International Standards are the major technical foundation of [...] the development of economic and trade cooperation”, leading the way for progress in our times.

Fostering partnerships

This was the second time that the ISO GA was held in China. “The first time was nearly 20 years ago,” reminisced ISO's President Dr Zhang Xiaogang. “Much has changed during that time, but the importance of different countries working together to solve global challenges, rather than acting alone, remains as important as ever.”

The week-long event was hosted by SAC, ISO's member in China. Tian Shihong, Administrator of SAC, pledged his country's full dedication to the collaborative work done in ISO. “China will continue to increase exchanges with other countries and international organizations in terms of its development strategies, and enhance cooperation in standardization,” he said.

To mark the occasion, China Post issued a stamp for the 39th ISO General Assembly a day before its opening, making it the first commemorative stamp in the history of the ISO GA – and a nice token of China's commitment to world standardization.



Kevin McKinley, Acting Secretary-General of ISO.

Highlights of the week

During the ISO Week in China, delegates reviewed a broad spectrum of business on the ISO agenda and heard excellent speakers on a theme that runs through ISO's general goal – supporting global economic and social development.

Key issues in standardization from the perspectives of ISO's partner organizations, the International Electrotechnical Commission (IEC) and the International Telecommunication Union (ITU), were highlighted by Frans Vreeswijk, General Secretary of IEC, and Houlin Zhao, Secretary-General of ITU, who provided insights on the ongoing good collaboration among all three organizations.

Among the myriad meetings taking place during General Assembly week were:

- Four breakout sessions devoted to engaging public authorities in international standardization ; services ; upcoming high-impact ISO standards ; and ISO governance review
- The 50th meeting of the ISO Committee on developing country matters (ISO/DEVCO) on 11 September 2016
- A panel discussion on ISO's regional engagement strategy, currently under development
- A panel discussion on innovation, the United Nations Sustainable Development Goals¹⁾ and standardization

These interactive discussions served as a platform for extensive engagement and in-depth exchanges to help shape the direction of ISO's future products, services and systems.

1) Adopted by the United Nations in September 2015, the Sustainable Development Goals are a vision and a roadmap for a future of peace, dignity and prosperity on earth. The 17 aspirational goals aim to end poverty, protect the planet and ensure prosperity for all as part of the United Nations 2030 Agenda for Sustainable Development.



The stamp for the 39th ISO General Assembly issued by China Post.

ISO 14001 experts win technical excellence award

The group of experts that develops ISO 14001, the world's most recognized framework for environmental management systems, was awarded the Lawrence D. Eicher Award for excellence in technical work during the GA week. The distinction recognizes the significant contribution of an ISO technical committee or subcommittee to the development of International Standards.

According to ISO President Dr Zhang Xiaogang, ISO technical committee ISO/TC 207, *Environmental management*, subcommittee SC 1, *Environmental management systems*, was chosen for introducing "a number of innovations to help support its members and to promote its work externally".

This year, the standard celebrates its 20th anniversary. "For two decades, ISO 14001 has been helping organizations to better manage the impact of their activities on the environment," said Acting ISO Secretary-General Kevin McKinley during the awards ceremony. "It is implemented in over 300 000 organizations and helps to support the United Nations Sustainable Development Goals."

Jordanian wins ISO/DIN essay contest for young standardizers

An essay on the role of standards in the Jordanian economy was announced as the winning entry in the ISO/DIN contest for young standardizers in developing countries. The author is Majd Majed Shatnawi, Standardization Officer at the Jordan Standards and Metrology Organization (JSMO).

The contest, which is organized by ISO and sponsored by DIN, the German Institute for Standardization, aims to challenge and give an opportunity to young standards professionals to present their views based on their country's experience. The 2016 edition focused on "the role of International Standards in improving quality of life in urban areas".

Announcing the winner, DIN Director Christoph Winterhalter declared: "Mrs Shatnawi's essay was chosen as it successfully explains how International Standards can provide solutions to the many issues that her country is currently facing.

In a video related to her essay, Majd Majed Shatnawi affirmed: "So while quality of life may mean different things to Ahmad a performer in Amman, Ali a baker in Irbid, Mohammad a shopkeeper in Zarqa, Khaled a doctor in Aqaba, ISO standards help to keep them all in a good quality of life."



ISO President **Dr Zhang** presented the Lawrence D. Eicher Award to **Richard Taylor**, Standards Market Development Director at the British Standards Institution (BSI), which holds the secretariat of ISO/TC 207/SC 1, pictured here with **Elisabeth Stampfl-Blaha**, ISO Vice-President (technical management), and **Kevin McKinley**, Acting Secretary-General of ISO.

ISO standards help meet SDGs

Trade and standards are key for meeting the United Nations Sustainable Development Goals (UN SDGs), said Cecile Fruman, World Bank Group Director, Trade and Competitiveness Global Practices, speaking at the annual meeting of ISO DEVCO, which took place on 11 September 2016.

The SDGs are a priority for the World Bank Group, which signed a Memorandum of Understanding (MoU) with ISO in March 2016 to help increase countries' involvement in the development, adoption and use of International Standards that promote open, fair and transparent trade.



Cecile Fruman, World Bank Group Director, Trade and Competitiveness Global Practices.

“South-South trade is a key feature of the new international trade landscape,” she said, and standards build the confidence that underpins these different exchanges. She emphasized two powerful ways in which ISO standards contribute to achieving the SDGs, by helping to increase developing country participation in trade and as a vessel for practical solutions to implement the SDGs.

Promoting standardization is therefore an important goal for the World Bank Group. “As we intensify our work in the area of standards, together with ISO and many of you represented here today... closer cooperation and support, especially for developing countries, will be needed to maximize the opportunities that exist.”



The ISO General Assembly elected **John Walter** as ISO President.

Appreciation, appointments and elections

The ISO President presented ISO Vice-Presidents Elisabeth Stampfl-Blaha (VP technical management from 2012 to 2016) and Olivier Peyrat (VP Finance from 2014 to 2016), whose terms of office finish at the end of 2016, with the ISO bracelet and cufflinks as a token of ISO's appreciation for their contributions to ISO. In presenting the gifts, Dr Zhang paid tribute to the outstanding leadership and forward-thinking of Elisabeth and Olivier.

The ISO General Assembly elected John Walter (Canada) as ISO President for the 2018-2019 term. Mr Walter, who has served as ISO Vice-President (policy) since 2014, thanked the delegates of the General Assembly. “I am delighted and honoured to have been elected to this important international role and look forward to promoting the value and importance of standards, particularly as they support innovation and international trade,” he said. Mr Walter will serve as President-elect for one year starting on 1 January 2017.

The ISO General Assembly also appointed Dr Bronwyn Evans (Australia) as Vice-President (finance). Dr Evans' term in office takes effect on 1 January 2017.



Dr Bronwyn Evans (Australia) has been appointed as Vice-President (finance).

Standards key for growth of Chinese economy

High-level Chinese officials, including the country's Premier Li Keqiang, highlighted the importance of International Standards at the Open Session on “Standards Improve Global Connectivity”, which took place on 14 September 2016. This was a chance for China to feature its special contribution to international standardization through presentations by many leaders from local business and industry.

Speaking to a gathering of over 500 representatives from national standards bodies, international organizations, public authorities and business, Premier Li stressed the relevance of standards to help China recover from its sluggish economic growth. “Standards are the basis for technological advancement,” he explained, adding that with today's rapidly evolving technologies, we need to speed up the implementation, formulation and revision of standards. China has already intensified its efforts to apply International Standards, said Premier Li. Yet to maintain steady economic growth, the country must now focus on reform and upgrading its economic structure and manufacturing, which he referred to as the backbone of the Chinese economy, in pursuit of a greener, more sustainable economy. For China's Premier, it is also time for the country to modernize its administration, so that the government is no longer the sole supplier of standards.

The event also featured presentations from other Chinese government officials and national examples from China illustrating how standardization is promoted in the various regions.

Representatives of UNCTAD, UNIDO, ITC, the World Bank Group and other international organizations also highlighted the role of standards as a “passport” for international trade and development – a cost-effective way to boost economic recovery and ensure sustainable patterns of production and consumption for the future.

Concluding a very fruitful meeting, SAC and ISO reiterated the ISO General Assembly's commitment to enhancing regional and international cooperation on standardization as an important means to improve global connectivity and jointly signed what will come to be known as the “Beijing Statement”.

Next General Assemblies

The 2017 ISO General Assembly will be held on 20-22 September 2017 in Berlin, Germany, at the invitation of ISO's member for the country, DIN. The 2018 GA will be held in Geneva, Switzerland, at the invitation of ISO's national member, SNV, and the ISO Central Secretariat. ■



“Standards are the basis for technological advancement”, underlined Chinese Premier **Li Keqiang** at the Open Session during the ISO Week in China.



ISO President **Dr Zhang** and **Tian Shihong**, Administrator of SAC, after signing the Beijing Statement.

