

climate

IEC and ISO Climate Action Kit





Our climate is in crisis. Now more than ever, it is time to protect what matters. For our world. For our future. Advancing a greener policy agenda is key.

CLIMATE ACTION

One important means to achieve meaningful reductions in carbon emissions is government policy. Policy is needed to support systems transition and transform our economies and societies for a fair, green and prosperous future.

Standards are a crucial aid to policy makers. They have a multi-faceted role to play in handling climate change, from the strategic and regulatory level to project goals, to making greener products. Enacting policies to support climate action will reduce carbon pollution at a scale and speed that makes a difference. This toolkit dedicated to climate action is designed to assist policy makers in their commitment to reducing net greenhouse gas emissions, at COP26 and beyond. It presents case studies on how standards can support public policies and influence climate change initiatives.

The time for robust climate action is now. Let's meet our targets and deliver the zero-carbon future we all need and deserve.

IEC and ISO International Standards and publications accelerate the successful achievement of the **Paris Agreement**, the **United Nations Sustainable Development Goals** and the **United Nations Call for Action on Adaptation and Resilience**.

A COLLABORATIVE APPROACH TO DELIVERING POLICY AMBITIONS FASTER AND MORE RELIABLY

Prof. Christopher Hodges and Scott Steedman

Humans will solve problems faster and more effectively if they collaborate. Doing this at a national level, where markets are influenced by policy that uses or references standards, can accelerate the outcome that a government wants to achieve.

The core idea

The core idea is to get all relevant parties together to work out not just what needs to be done, but also how to do it. This approach may be quicker and more effective than traditional ways of regulating to solve a problem. Putting the focus on innovation and implementation from the start, as part of agreeing policy on the need to address an issue and setting a system of rules, will speed up results.

One common approach for governments to achieve their goals is to think sequentially in implementing broad policy and to introduce a set of rules in legislation. The market follows like a cascade – sometimes in tune, sometimes not. New standards may emerge, or they may not.

In contrast, the approach recommended for governments is to co-create consensus with the relevant parties on what needs to be done. This also includes the ethical principles and standards that need to be applied and the design of the system for achieving them. Co-creating a system of legislative rules, stakeholder-led standards and accredited conformity assessment to deliver a policy objective will accelerate outcomes by building consensus, ownership and accountability across government, regulators, industry and all parties involved in the process.

There is extensive evidence that engagement will be maximized, both within individual organizations and between stakeholders:

- Where there is trust and respect between the different parties
- Where all stakeholders are involved in co-creating the system – not only the *what* but also the *how*, in the context of the *why*
- Where everyone involved in implementing and operating the regime can see and support the essential purposes, objectives and outcomes, which thereby maximizes individuals' internal motivation for achieving them
- Where the rules are based on principles that the society values and potential conflicts between opposing values have been debated and balanced at an early stage so as to provide clarity in implementation

The proposed approach

The proposed approach is simple and quick to put into practice:

- Encourage all the relevant stakeholders to come together in a neutral forum. This includes government, regulators, business and industry representatives, beneficiaries and end users (civil society), experts and intermediaries, such as standards, accredited conformity assessment, intellectual property and market surveillance bodies.





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Cover political objectives, practical delivery, economic mechanisms and ethical considerations.

- Agree on the objective, the purpose and the desired outcomes.
- Map the existing framework of standards and regulation.
- Agree on the ethical principles, standards and rules needed to achieve the objective and how they will work together. Assess the existing framework against the agreed approach.
- Coordinate the development of policy, standards and accredited conformity assessment. Iterate as necessary, using pilot projects to test the proposed solutions in the market.

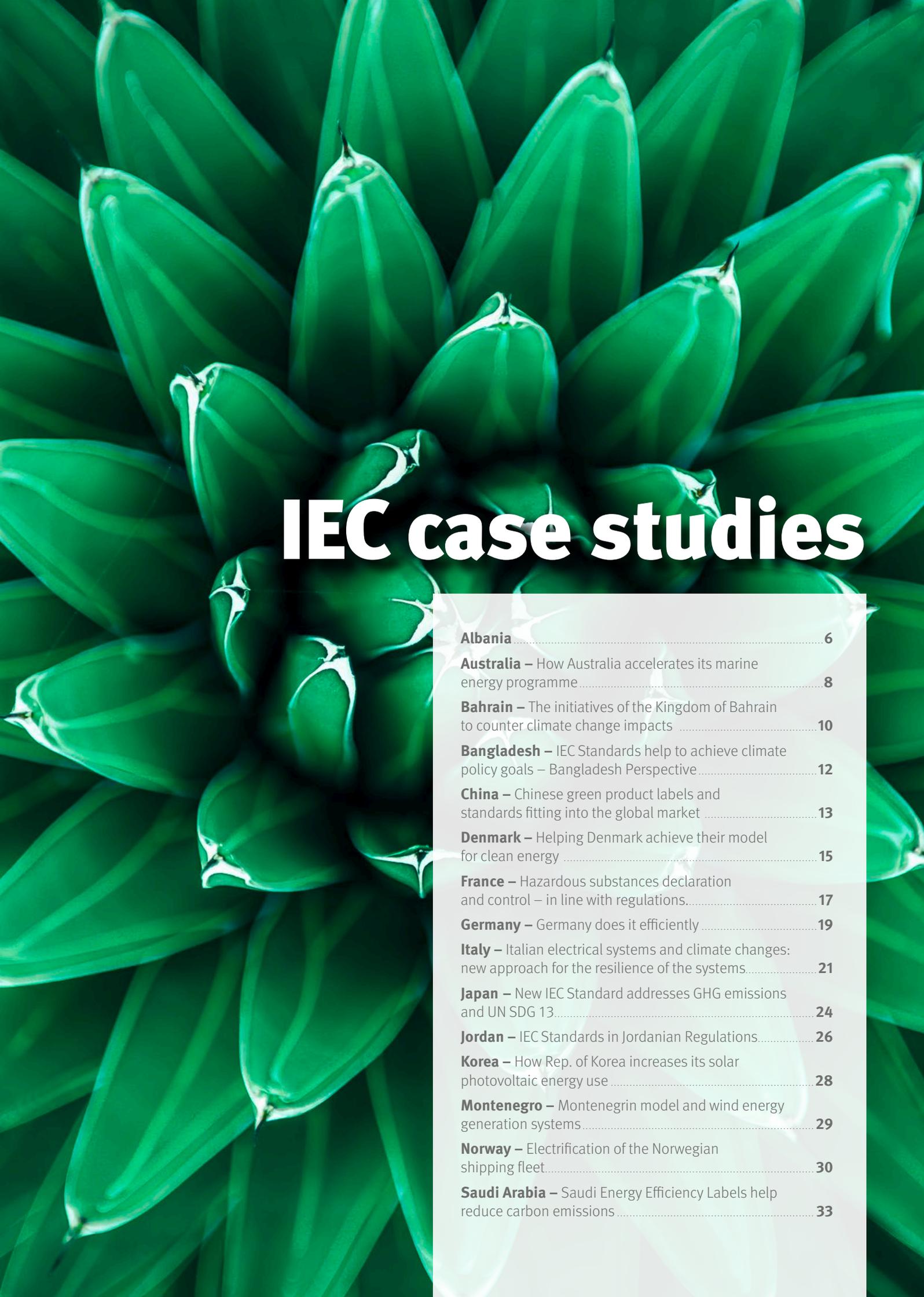
Five simple steps

This simple five-step collaborative approach to the co-creation of a systems-based approach to the delivery of policy objectives is based on strong scientific foundations and has the following advantages:

1. It draws together the knowledge and expertise of all relevant parties, especially government, regulators, academia, business, intermediaries, not just in agreeing the desired outcomes but also in ways of achieving them. It captures ideas and overcomes silos, enabling the development of joined-up thinking.
2. It provides challenge to established thinking, which is necessary for testing and developing ideas. The tone of the discussion can be carefully moderated, within a culture of respect for the contributions of all stakeholders and mutual trust, so as to facilitate relevant debate but maintain joint cooperation and achievement of the core goals.
3. It is agile and dynamic, readily adaptable to different policy areas and outcomes.
4. It builds ownership of the achievement of the outcomes and accountability for observance of the principles and rules on the part of those who have to apply them. This powerfully supports compliance and innovation in performance.
5. It builds in the support of citizens, civil society and those who are the intended beneficiaries of the system. This facilitates both challenge and support for the outcomes and actions that follow.

This systems-based approach to the efficient use of standards and regulations at national level will accelerate the delivery of policy objectives by governments working with their industries, societies and supporting infrastructure.

We recommend that this approach is adopted by national governments to support the rapid delivery and implementation of technological and other strategies needed to meet the climate change commitments that will be made at **COP26**.



IEC case studies

| | |
|---|----|
| Albania | 6 |
| Australia – How Australia accelerates its marine energy programme | 8 |
| Bahrain – The initiatives of the Kingdom of Bahrain to counter climate change impacts | 10 |
| Bangladesh – IEC Standards help to achieve climate policy goals – Bangladesh Perspective | 12 |
| China – Chinese green product labels and standards fitting into the global market | 13 |
| Denmark – Helping Denmark achieve their model for clean energy | 15 |
| France – Hazardous substances declaration and control – in line with regulations | 17 |
| Germany – Germany does it efficiently | 19 |
| Italy – Italian electrical systems and climate changes: new approach for the resilience of the systems | 21 |
| Japan – New IEC Standard addresses GHG emissions and UN SDG 13 | 24 |
| Jordan – IEC Standards in Jordanian Regulations | 26 |
| Korea – How Rep. of Korea increases its solar photovoltaic energy use | 28 |
| Montenegro – Montenegrin model and wind energy generation systems | 29 |
| Norway – Electrification of the Norwegian shipping fleet | 30 |
| Saudi Arabia – Saudi Energy Efficiency Labels help reduce carbon emissions | 33 |

ALBANIA

As the efforts against climate change intensify across the globe, carbon neutrality has become one of the focal points of policy making worldwide and especially in the EU. In the framework of undertaking measures for environmental protection globally, Albania has signed the Paris Agreement on April 22, 2016, entering the new era of the international climate policy process. Also, Albania acceded to the United Nations Framework Convention on Climate Change (UNFCCC) in 1995 and the Kyoto Protocol in 2005.

This is an integral part of the European Union integration process and includes the development of national monitoring and reporting capacities, annual greenhouse gas (GHG) policies, formulation and implementation of policies to reduce GHG and adaptation to climate change, transposition and implementation of the European Union climate change acquis. The law no. 155/2020 and the National Renewable Energy Plan are the basis for meeting the climate protection objectives, helping the Albanian government achieve its clean energy model.

In line with the EU targets 20-20-20, Albania has introduced the National Contribution, set out within the Paris Agreement process in September 2015, committing to reducing CO₂ emissions compared to the baseline scenario in 2016 and aiming for a reduction by 11.5% in 2030. To achieve this objective, the Albanian government is working to reduce car emissions through measures such as facilitated market entry of new and electric cars, tightening procedures for the entry of old cars, etc.

Promoting the use of hybrid and electric cars in urban/interurban traffic is another challenge undertaken mainly by the municipalities of large cities to meet the objectives undertaken by the government according to law 155/2020. The goal in the Municipality of Tirana (the largest administrative unit in the country) is that urban transport, inside Tirana, is to be done by electric bus or hybrid.

The General Directorate of Standardization in Albania (DPS) has established the Technical Committees (TCs), which are part of the Albanian National Committee of the IEC. DPS/TC 4 covers this field as a mirror committee of IEC/TC 69, adopting IEC standards and making them available/usable at national level to all interested parties (designers and investors).

According to INSTAT (Albanian Institute of Statistics) registrations, about 90% of electricity in Albania is produced by hydropower plants. DPS/TC 3 and DPS/TC 4 deal with the adoption of IEC standards that cover the field of turbines, transformers, cables, etc., assisting not only regulators but also manufacturing entities and all those interested in these standards.

Law no. 7/2017 *To promote the use of energy from renewable sources and the national action plan for renewable energy sources*, promotes the use of renewable sources of energy by facilitating measures to stimulate the production of energy from photovoltaics (PV). It also facilitates procedures for issuing construction permits for PV systems and their introduction in the public supply network. This has led to an increase in the production of renewable energy from PV.

Setting a competitive price for energy produced by PV for 2019 and 2020 of EU 100/KW helped increase interest in investing in this field. A considerable number of PV projects have already been realized, resulting in the construction of plants with an initial production of 2-3 MW. Applications for energy production with PV systems for over 3 MW continue.

DPS/TC 6 covering the field of IEC/TC 82 for PV, responded to this challenge by assisting not only regulators in the basic requirements for design, construction and materials to be used, but also investors and all those who are interested in this set of standards. This TC (DPS/TC 6) has organized intensive work to adopt all the international standards of IEC/TC 82, as Albanian standards. It has also undertaken an information campaign for all firms operating in this field, informing them about relevant standards, and inviting them to take an active part in the adoption and discussions on these standards.

The national plan also includes the objective of the government for the promotion of projects in the field of wind energy, of which some are being implemented but production has yet to begin. DPS/TC 3 covers the field of IEC TC 88 for wind turbine. It assists the regulator and investors/designers in defining and reflecting in their projects the requirements for wind turbines and systems in terms of safety, efficiency and sustainability, etc..The IEC 61400 series of standards by IEC TC 88, has grown alongside the requirements of the wind turbine and wind systems market.

Increasing energy efficiency is also a very important area where both central and local government policies are being focused. The aim is to encourage investment to increase energy efficiency and energy savings. In answer to these objectives of the Albanian government, the DPS has established DPS/TC 6 covering the field of energy efficiency and energy saving for household appliances and electrical installations of buildings. It assists the regulator and all stakeholders with the implementation of adopted standards developed by IEC TC 61, IEC TC 59, as well as IEC TC 64. In this context, some very important projects have been implemented and many private initiatives have been undertaken in the framework of energy efficiency in buildings.

Also, DPS/TC 4, which covers luminaries, is assisting all stakeholders, including the Albanian local governments, as well as various design entities and investors in a series of projects based on standards related to the energy efficiency of luminaries and public road lighting, using mainly LED to maximize energy savings.

AUSTRALIA

How Australia accelerates its marine energy programme

Oceans offer a massive source of clean energy which can be used to produce electricity, by harnessing waves, tides, currents, and ocean temperature differentials.

The third largest [exclusive economic zone](#) with over 80% classified as offshore, beyond two nautical miles from the coast and subject to oceanic waves, tidal currents and wind, Australia could produce huge amounts of electricity as ocean energy conversion technologies mature.

IEC International Standards

IEC Technical Committee 114 develops international standards for marine energy, covering wave, tidal and other water current converters. Australia became a full member of [IEC TC 114](#) in 2020 lending its global marine energy expertise to this technical committee. Australia wants to be part of the global marine energy community and contribute towards standards development. It is a member of the Ocean Energy Systems Technology Collaboration Programme ([OES](#)) established by the International Energy Agency, for the development of ocean wave and tidal current energy.

Stephanie Thornton, Cluster Manager of the [Australian Ocean Energy Group \(AOEG\)](#), worked closely with [Standards Australia](#) to prepare its application for membership in IEC TC 114.

Internationally developed marine energy standards underpin each stage of development of marine energy devices. Technologies must incorporate these standards in their engineering designs to ensure high-quality, reproducible operational results, reducing risks and instilling confidence for all stakeholders.

Importance of participating in global standardization

Membership in IEC TC 114 allows Australia to strengthen the role it plays in OES. OES work covers the technical side of ocean energy development with a perspective that goes beyond focusing on devices and guidelines.

In the future, standards will become critically important to demonstrate how ocean energy devices integrate to energy systems. Ocean energy devices might be installed on the seafloor or surface, in shallow or deep waters with big or small waves. Standards will be vital to provide consistency in how devices are installed and connected and how electricity is delivered to the end user on shore.

Facilitating regulation and approval

Permit consensus is challenging since this is a relatively new field. It will make a big difference if marine energy companies can demonstrate the use of global and universally adopted standards, which help reduce risk and concerns and instil confidence in the regulators to issue consent.

This also applies to environmental protection factors. Standards help instil confidence in end users, regulators and even communities.

BAHRAIN

The initiatives of the Kingdom of Bahrain to counter climate change impacts

Being a developed country with a small geographical area, has facilitated the cooperation among all relevant government entities such as the Ministry of Industry, Commerce and Tourism, the Electricity and Water Authority, and the Supreme Council of Environment, among other government entities, in order to reduce the impact of climate change in the region.

Local Initiatives

Although Bahrain is an oil producer and Member of OPEC (oil production forms the major income source of the national economy), policy makers in Bahrain realized the importance of the use of renewable energy sources to reduce the impact of climate change and increasing the energy efficiency potential.

Accordingly, a number of local energy efficiency initiatives were introduced, such as:

- Minimum Energy Performance and Labeling for Lighting Technical Regulation that was implemented through the Ministerial Order No. (3) 2015. This technical regulation banned the sale of halogen bulbs for general household use in the Kingdom of Bahrain by regulating the non-directional household lamps;
- Energy Performance Technical Regulation and Labeling requirements for Air Conditioners, as per Ministerial Order No. (70) 2015. This Regulation specified the Minimum Energy Performance Standard (MEPS) and the energy labelling requirements for air conditioning units and heat pumps used in residential and commercial sectors;
- Vehicles and Tires Efficiency Technical Regulation and Labeling with respect to fuel efficiency and other essential parameters have been entered into force for models since 2018.
- Electric Vehicles Technical Regulation approved and issued as per Ministerial Order No (16) 2021 regarding Electric Vehicles. Through this Technical Regulation, the import of electric vehicles will be allowed and their use is permitted provided that they meet the requirements.

Participation in the IEC

Bahrain is an IEC Associate Member. The IEC National Committee of Bahrain was created under the secretariat of the Ministry of Industry, Commerce and Tourism and headed by the Electricity and Water Authority. Bahrain participates in the following Technical Committees: TC 82 WG 3: *Systems*, TC 82 WG8 – *Photovoltaic (PV) cells*, TC 88 - *Wind energy generation systems (liaison)* and TC 88 PT61400-50-4: *Wind energy generation systems – Part 50-4: Use of floating lidars for wind measurements*.

We strongly believe that our involvement in these IEC working groups will help Bahrain to achieve the National Renewable Energy Action Plan (NREAP) which sets a national renewable energy target of 5% by 2025 and 10% by 2035 and the National Energy Efficiency Action Plan (NEEAP) which sets a national energy efficiency target of 6% by 2025.

BANGLADESH

IEC Standards help to achieve climate policy goals – Bangladesh Perspective

The vulnerability of Bangladesh to climate change is mainly shaped by being a low-lying delta area divided by hundreds of rivers in combination with socio-economic status of large parts of the society being dependent on agricultural sectors, as well as insufficiently developed infrastructure that is not fit for purpose to cope with increasing climate change related risks. Adopting the IEC Standards as Bangladesh Standards in different sectors, especially the standards which are useful to mitigate climate change is a very important task performed by the IEC National Committee (NC) of Bangladesh under Bangladesh Standards and Testing Institution (BSTI) which is the National Standards Body (NSB) of Bangladesh.

The energy-efficient appliances are essential to help saving money and energy, protect the environment, and enhance lifestyle. Thus, the more energy efficient home appliances used, the lower the utility bills will be while protecting the environment from harmful gases such as carbon dioxide.

The IEC National Committee (NC) of Bangladesh as well as BSTI encourage the use of energy efficient home appliances, such as LED bulbs, fans, air conditioners, etc., as well as the use of electrical motors instead of combustion motors.

Energy efficiency standards (emphasis given on adoption of IEC Standards) are also mandated by Statutory Regulator Order (SRO) in order to confirm the proper implementation of aforementioned product standards.

Using the sun to generate more and more power means less and less harmful emissions from burning fossil fuels. Generating electricity from solar panels produces no harmful emissions. When more homes and businesses rely on solar power this means fewer toxic emissions from fossil fuels into our air. In this regard, Bangladesh has already taken the necessary steps to ensure proper use of solar equipment as well as issued an SRO on solar equipment based on IEC Standards such as: solar module, inverter, solar battery, charge controller, etc.. Therefore, these steps will help Bangladesh to achieve its climate policy goals.

CHINA

Chinese green product labels and standards fitting into the global market

The objective and benefits of green product labels

Nowadays, the consumers of electrical and electronic equipment (EEE) are becoming increasingly aware of a products green/low carbon performance. In answer to this trend, different green product label schemes (normally known as ecolabels, environmental labels) have been developed and implemented in different countries/regions.

By getting certified to one or more of these ecolabel schemes and, by being committed to meeting the targeted environmental impacts such as reduction of energy consumption or greenhouse gases emission throughout the entire product life cycle, manufacturers can achieve a market advantage by differentiating themselves from competition.

Potential burden of green product labels

However, due to geographical variations and market segmentations, currently over 80 ecolabels for EEE products exist. Because of their large number, variety, and sometimes unequal or conflicting requirements, ecolabels can represent an additional burden for manufacturers, and cause confusion for consumers.

China's green product labeling policy

China is one of the most important green consumption markets in the world. The Chinese government has recognized that the development and implementation of green product certification standards is key to promoting green, low-carbon and circular economy and cultivating a green consumption market. For this reason it has initiated a unified system of standards, certification and labeling for green products. The system covers environment-friendly, energy-saving, water-efficient, low-carbon, recyclable, and organic products. However, when these EEE products are exported, even though they already meet local ecolabel certification standards, they have to be retested, which costs time and money.

How IEC International Standards help

To solve the problem, IEC/TC111 has carried out a feasibility study on “the harmonization of environmental performance criteria for EEE products” led by the Chinese NC. The study compiled information on some of the most influential ecolabel schemes in the global market to identify compatibility of different standards. The hope was to promote the coordination and harmonization of ecolabel standards throughout various countries and regions.

The study resulted in the publication of IEC TR 63212:2020, which confirmed the feasibility of coordinating the environmental performance criteria for EEE products at the international level and laid the foundation for a future international standard.

This publication helps promote green design, manufacturing, and consumption of EEE products in China as well as in other countries. It also allows manufacturers to save time and money for the certification of their products, and improves the efficiency of international trade. Last but not least, it makes it possible to realize the green and low-carbon objectives declared by ecolabels.

DENMARK

Helping Denmark achieve their model for clean energy

As the fight against climate change intensifies across the globe, carbon neutrality has become one of the focal points of policy making around the world and notably in the EU.

Danish model and wind energy generation systems

Wind energy met an estimated 48% of Denmark's electricity demand in 2020 and accounted for 58,6% of the country's total energy generation.

Over the years, the country has become a living testing ground for new technologies related to wind energy and other renewable energy systems. Policy makers are aiming for the country to be totally reliant on renewable energy by 2050.

The Danish model is based on three main pillars: energy efficiency, renewable energy and system integration and development, including electrification. Wind energy systems are at the heart of Denmark's renewable energy transformation. This transformation would not have been as smooth nor as fast without relying on key IEC Standards.

Several IEC Technical Committees develop international standards for renewable energy systems. Among them, [IEC TC 88](#) prepares standards for wind energy generation systems. These consensus-based international standards are widely adopted around the world to ensure wind turbines and systems meet the required specifications for safety, efficiency and sustainability. Denmark has been a key contributor to the standardization of wind energy systems over many years.

The [IEC 61400](#) series of standards, issued by IEC TC 88, has grown alongside the requirements of the wind turbine and wind systems market, over the last 20 years.

Danish experts, alongside specialists from other countries, have given their input to these standards which have been revised to meet various requirements over the years and helped establish wind energy generation systems in many other countries around the world. The Secretary of TC 88, Christine Weibøl Bertelsen, a Danish expert, explains: “We work with Danish regulators, give input, and our standards are being used as a basis for regulation both in Denmark, in Europe and around the world. It is very rewarding.” These standards help ensure that wind energy generation systems are safe, efficient and, increasingly, reusable and recyclable.

In the IEC, standards are developed from the start with the involvement of all interested members. Each of these IEC member countries sends technical experts to work at the international level in the IEC to develop state-of-the art, globally relevant international standards. These experts also ensure that national needs of regulators and policy makers, industry, research laboratories, testing and certification institutes, etc. are taken into account in the final standard. This ensures that standards can be adopted or adapted nationally; one of the reasons why around 80% of national standards are identical or very similar to IEC Standards.

IEC Standards are referred to in regulations and used by manufacturers to build technical devices and systems to broadly agreed safety, efficiency and performance criteria. This way, IEC International Standards open the door to international trade in sustainable technologies.

FRANCE

Hazardous substances declaration and control – in line with regulations.

Hazardous substances can be found in many products, including electrical and electronic devices and systems. As countries have become more conscious of the negative impact of these substances on the environment, regulations have been adopted to enforce their reporting. It is nowadays one of the most strictly regulated areas related to environmental protection.

IEC publishes an international standard on substance reporting which improves transparency up and down the electronics supply chain. The reporting also helps suppliers and manufacturers to comply with existing regulations. IEC 62474 defines the content of the materials and substances declaration for business-to-business stakeholders and describes different use cases for this form of data exchange.

Components, needing regular updates, are managed in a public database that includes a declarable substance list (DSL), which is updated in line with regulatory requirements, and a harmonized XML declaration format to facilitate the exchange of data in the supply chain.

A typical example of such substances regulations is the EU Restriction of Hazardous Substances ([RoHS](#)) Directive, which restricts the use of heavy metals and flame retardant materials in electrical and electronic products and which was most recently amended in 2015, to add a restriction concerning phthalate materials.

The IEC 62474 list of substances is regularly updated, as new or revised regulations are released. “It is brought up to date by three different groups dealing with separate geographical areas: Americas, Asia and Europe, Middle East and Africa (EMEA). These groups keep track of the various regulatory changes around the world,” says Christophe Garnier, chair of IEC Technical Committee 111, which publishes the standard.

On 9 September 2019, the European Chemicals Agency (ECHA) announced the establishment of a database of Substances of Concern in Articles, as such or in complex Products (SCIP). It will hold information on products that contain substances of very high concern (SVHC). These substances are listed in the European Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) which is updated every six months. Companies who sell or import products into the EU are required to submit a dossier for products containing SVHCs to the SCIP database since 5 January 2021.

“We have already extended the IEC 62474 standard to support the SCIP database making it easy for companies to collect content for SCIP using our standard”, Garnier explains.

IEC is currently working with ISO on a new edition of the standard – ISO/IEC 82474 – which will enable all companies - not only those related to electrical or electronic products - to use the XML declaration format and web services. These services are new components of the standard, expected to facilitate system to system data exchange and to reduce costs. “We already have automotive and aerospace companies on board and standardization work is moving fast,” Garnier describes.

The expectation is for European regulators to refer to the ISO/IEC 82474 standard as an “harmonized electronic format” to feed the SCIP database. “We are doing the preliminary work for them” Garnier indicates.

One of the pluses of the standard is that it also enables substance control declaration for recycling, re-using, or refurbishing, in a circular economy approach. “We are thinking of adding a category to specify the origin of materials to indicate whether they are recycled, for instance”, Garnier adds.

The standard is an example of close collaboration between IEC and ISO, involving representatives from multiple industry sectors, as well as working with regulators in the EU and around the world.

GERMANY

Germany does it efficiently

The risks to Germany from the consequences of global warming have been known for a long time and were comprehensively identified in the climate impact and risk analysis for Germany. To reduce greenhouse gas emissions, energy consumption must be significantly reduced, and energy efficiency must increase. After all, energy efficiency is the cleanest and most affordable source of energy.

The German Energy Efficiency Strategy 2050

With the Energy Efficiency Strategy 2050, the German Government for the first time sets a target for the reduction of primary energy consumption by 2030, bundles corresponding measures and initiates a broad-based stakeholder process for the further development of energy efficiency policy.

In terms of energy efficiency, the German government aims to shape the German economy into the most energy-efficient economy in the world and, in doing so, to drastically reduce primary energy consumption by 2050. The strategy sets the course for more energy efficiency in Germany and makes an important contribution to the implementation of energy and climate policy goals at national, European, and international level.

IEC standardisation

The efficiency of household electrical appliances and their environmental impact is getting rapidly increasing attention worldwide.

Germany is actively contributing to IEC standardisation work done by a.o. [IEC TC 59](#) *Performance of household and similar electrical appliances* and its eight subcommittees. Together with many experts from various countries more than 250 experts and about 25 officers and convenors from Germany develop international standards on methods to determine performance and energy efficiency of electrical appliances for household use or for commercial use.

The global trend towards regulation concerning product and energy efficiency leads to an increased demand for measurement methods. To avoid multiplication of efforts to serve national and regional regulation and testing demand, a common and accepted set of international standards is the goal of the joint efforts in IEC as a global group of technical experts.

IEC Standards, together with testing and certification, help countries and industries to adopt more sustainable technologies. They also help strengthen the disaster resilience of infrastructure, reducing disaster risks, accelerating recovery and overall impact.

IEC Standards' support to European legislation

The Ecodesign Directive is a European success story in terms of energy savings and now also in terms of resource efficiency. It ensures that all actors in the European Union act according to the same rules and is largely supported by IEC Standards.

With the publication of new regulations for refrigerators ([IEC 62552](#)), washing machines ([IEC 60456](#)), tumble dryers ([IEC 61121](#)), dishwashers ([IEC 60436](#)), televisions ([IEC 62087](#)) and lamps ([IEC 62442](#)), the course is set for more eco-design and more energy efficiency. According to the EU Commission's estimate, the new regulations will save around 167 terawatt hours of energy per year by 2030.

Now the Ecodesign Directive, which regulates the minimum requirements for the environmentally sound design of energy-related products within the EU, also addresses standards for resource efficiency. The aim is to extend the service life of appliances and to facilitate their maintenance, reuse, and recycling.

The familiar energy labels that provide information on the energy efficiency class remain. However, much stricter values now apply to household electrical appliances. As an incentive for manufacturers to further develop their appliances through further innovations, the requirements have been chosen in such a way that at first efficiency class A and sometimes also efficiency class B will remain free.

Find out more about [IEC/TC 59](#).

ITALY

Italian electrical systems and climate changes: new approach for the resilience of the systems

Growth in electricity use and an increasing level of power quality needs have required a continuous expansion of power transportation and distribution systems.

This process has needed technology and standard development to create a competitive advantage for producers and the economy, while safeguarding consumers' interests.

Meanwhile, climate change has altered the baseline environmental conditions heretofore used in electric power transmission and distribution systems design and planning. In this context, electrical systems, like natural, social, and economic systems, have therefore become more vulnerable.

Conditions such as average annual temperature increase, different kinds of precipitation (e.g. wet snow vs. ice), more frequent and severe weather events, require a more efficient and effective approach in the construction and operation of electrical grids. In short, it is necessary to consider the resilience of systems which includes increased network robustness to withstand extreme stress and improvements in effectiveness and speed of recovery. This new approach contributes significantly to the proper use of available technical and economic resources in response to climate change.

The Italian Regulatory Authority for Energy and Environmental resources (ARERA) is focusing on network resilience to properly address the development of infrastructure projects according to criteria of efficiency, cost-effectiveness and safety.

ARERA has given an official mandate to CEI for the development of national guidelines, technical reports and technical specifications that will help all stakeholders to design a more resilient infrastructure.

The importance of IEC International Standards

The international technical community has dealt with *resilience*. IEC is increasingly focusing on this aspect which has become more and more fundamental. It is involving mainly IEC TC 8: System aspects of electrical energy supply, which is already including this topic in its strategic business plan, and IEC TC 123: Management of network assets in power systems in the preparation of guidelines/technical reports/technical specification and standards that will help all stakeholders to face this challenge.

Italian climate objectives

Italy has adopted an Integrated National Plan for Energy and Climate that is structured in 5 lines of intervention to be developed in an integrated manner: decarbonization, energy efficiency and security, development of the internal energy market, research and innovation and competitiveness. A further boost to these objectives is given by the recent National Plan for Recovery and Resilience, which among its missions includes the “Green Revolution and Ecological Transition”.

Smart metering systems in smart grid

An important contribution in this context is, for example, the plan to install second-generation Smart Meters for all electricity users, which is underway and will be completed by 2026.

Italy Legislative Decree 102/2014 provides that the Italian Regulatory Authority for Energy and Environmental resources ARERA shall define the specifications for the second generation meters “taking into account the international standard IEC 62056”.

Consequently, with Resolution 87/2016/R/EEL, the said Authority has entrusted the Italian Electrotechnical Committee (CEI) with the definition of a standard protocol, unified at national level, for communication between second-generation (2G) smart electricity meter and end-customer devices under interoperable conditions. This is to enable new opportunities and services related to consumption awareness and energy efficiency, such as new forms of supply, load control and home automation.

Also worth mentioning is ARERA’s assignment to CEI for the drafting of a Specification for the Recharge Infrastructure Controller for smart recharging of electric vehicles, which will also enable Vehicle to Grid (V2G) functions to support the electricity grid.

The importance of IEC International Standards

The reference to IEC International Standards for the metering industry (IEC TC 13: *Electrical energy measurement and control*) is certainly a fundamental aspect in a moment of epochal changes both for the liberalization of energy markets and for the pushes coming from environmental sustainability and energy efficiency.

Meters are a basic component of Smart Grids (IEC TC 8: *System aspects of electrical energy supply*). They enable the active participation of customers who have moved from simple users to producers. It allows the development of widespread generation from renewable energy sources, the increase of electric vehicles, the development of home automation and the sharing of information with the user resulting in increased awareness of energy use.

Electricity grids are increasingly integrated and require, for proper operation, more and more data, collected more frequently at many more levels (IEC TC 57: *System aspects of electrical energy supply*). The security of this data and the privacy of personal data become essential requirements. Data collection also extends to other energy services (gas, water, heat).

Continued innovations in electronic, information and communication technologies make the use of these advanced capabilities possible. There is also the issue of reducing environmental impact over the entire life cycle of the equipment itself. This implies the need for harmonized requirements: consequently, international standards that guarantee “standard” meters for all these aspects become essential.

JAPAN

New IEC Standard addresses GHG emissions and UN SDG 13

In a bid to reduce the rise in the global average temperature, countries have set targets to reduce their greenhouse gas (GHG) emissions as part of their commitment to the Paris Agreement. Japan has pledged to decrease its GHG emission levels by 46% by 2030.

The global home appliance industry was worth more than USD 420 billion in 2020, and is expected to reach USD 500 billion by 2023, according to [research](#) by Statista. Action is already being taken to help reduce GHG emissions caused by electric and electronic (EE) products, such as improving raw material acquisition, extending product lifetime, and limiting or replacing substances that result in additional GHG emissions.

As part of this effort, IEC is developing a new horizontal standard, IEC 63372, which will provide the principles, methodologies and guidance for the quantification and communication of GHG emissions, emission reductions and avoided emissions from EE products, services and systems. The draft IEC 63372 expands the scope of two existing technical reports, IEC TR 62725 and IEC TR 62726, to include avoided emissions, which are defined as the GHG amount not to be emitted thanks to the use of digital systems.

Avoided emissions refers to greenhouse gas emission reduction that occurs outside the boundaries of the reporting organization as a direct consequence of the use of its products. It is the difference between the GHG emissions of an advanced product, service or solution and the hypothetical GHG emissions of a conventional product which serves as the baseline reference. For example, when using a refrigerator with high energy efficiency gains, CO₂ emissions are reduced compared to the hypothetical use of a conventional refrigerator that consumes more electricity.

Japan is leading this work being carried out by IEC Technical Committee 111, which covers environmental standardization for electrical and electronic products and systems, as Convenor of Working Group 17 on greenhouse gas.

Organizations taking climate action, need an international standard to quantify GHG emissions, emission reductions and avoided emissions using uniform calculation methods so that EE companies can determine the amount of emissions, for which they are responsible.

IEC 63372 will enable them to declare that their results are aligned with agreed requirements and the guidance. This standard will allow its users to declare or disclose information about CO₂ emissions, emission reductions and avoided emissions for any EE product, solution, system. This in turn will allow the EE industry to claim that its products, solutions and systems can reduce and/or avoid users' emissions and help solve an essential social issue.

The new standard expands the scope of the previously mentioned technical reports to include avoided emissions. It enables calculating the GHG amounts not emitted or avoided, using EE products and systems, whether or not they are digitalized.

Though other standards exist, such as the Greenhouse Gas Protocol and ISO 14067 which covers greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification, IEC 63372 directly addresses EE products. While it basically aligns with the aforementioned standards, it specifically focuses on GHG emissions, emission reductions and avoided emission by EE products, services and systems. No other standard provides a method to calculate avoided emissions. It is the most in-depth and advanced standard on this topic. It also contributes towards achieving the United Nations Sustainable Development Goal 13: Climate action.

Finally, artificial intelligence, the Internet of things and digital twins offer significant potential for emission avoidance. One of the purposes of this international standard is to establish methodologies to assess the avoided emissions using such technologies.

JORDAN

IEC Standards in Jordanian Regulations

In recent decades, the world shows a significant interest in environmental topics and finds effective solutions in using Renewable Energy Sources (RES). For example, in Jordan the contribution of RES is approximately 20% from installed generation capacity. The energy sector policy of the Jordanian government which has been expressed in the energy strategy 2007-2020 formulates three main objectives dedicated to energy efficiency and renewable energy. It includes the following:

1. Provide a reliable source of energy for the country, at the lowest possible cost;
2. Increase the utilization of indigenous resources and renewable energies to increase energy supply security;
3. Improve the efficient use of energy to reduce oil imports, postpone the need for new investment in production facilities, and reduce the emission of greenhouse and toxic gases into the environment.

More particularly, the strategy aimed to reach the target of 20% improvement in energy efficiency by the year 2020. However, this strategy had to be operationalized through short and midterm action plans with concrete and feasible energy efficiency measures. Therefore, the Jordanian government, by following good regulatory practice, has taken many measures to develop the regulatory and legislative framework to reach these objectives. IEC plays an important role in this mechanism; IEC Standards are clearly referred to in such regulations to be used by manufacturers to create devices and systems to internationally agreed and accepted performance criteria on safety and efficiency.

For example, in order to fulfil government responsibilities with respect to the safe, secure, reliable and economic operation of the electricity distribution system the distribution companies in Jordan shall organize and carry out monitoring, testing and investigation into the electrical equipment or electrical installation at user level.

They shall also apply testing and monitoring procedures on the distribution System using the technical criteria of IEC testing guidelines and/or manufactures recommendations for example but not limited to:

- 1.** Ensuring that all meters, current transformers, and voltage transformers are tested by an authorized body in accordance with the relevant IEC Standards;
- 2.** Ensuring that all equipment at the connection point complies with the requirements of the IEC Standards or their equivalent national standards;
- 3.** Ensuring that the Intermittent Renewable Resource (IRR) (wind and photovoltaic (PV)) connecting at high or medium voltage networks complies with connection requirements as per IEC Standards.

IEC Standards are the essential technical tool to ensure the good implementation of Jordanian electrical regulations by steering the quality of the voltage, including its frequency. They ensure that the resulting current at the connection point, does not exceed the limits according to IEC guidance and standards.

KOREA

How Rep. of Korea increases its solar photovoltaic energy use

IEC TC 82 is responsible for standardization of solar photovoltaic energy systems under the IEC Standardization Management Board (SMB). Since its establishment in 1981, South Korea has become a participating (P) member since 2002, sending approximately 70 experts to participate in IEC TC 82.

Korean PV experts actively participate in IEC TC82 international meetings and the development of international standards for solar cells, solar cell modules, systems and power conversion devices. In recent years, Korea proposed three new work items and all of them have been published as International Standards (IS):

IEC PT 62994-1 Environmental Health & Safety (EH&S) Risk Assessment of the PV Module increased interest in the influence of long-term environment and health of photovoltaic modules which are the components of solar photovoltaic systems;

IEC 63092-1 and IEC 63092-2 building integrated photovoltaic (BIPV) standards made a huge contribution to energy savings in buildings.

Based on standard test methods such as IEC 61215-1, IEC 61215-2, a national standard, Korean Standard (KS) C IEC 61215 was established in 2005. With this publication and after starting domestic solar photovoltaic certification since 2015, KS C 8561: *Crystalline silicone photovoltaic (PV) module performance* was published and is currently in operation.

With the revision of KS C 8561 in 2020, the minimum energy efficiency of solar PV modules (over 17.5%) was applied to certify modules and this contributed to the increase of solar photovoltaic energy use in Korea. Additionally, Korea incorporated technical regulations for floating photovoltaic into the Korean Standard for the first time in the world to contribute to the revitalization of renewable energy generation utilizing the surface of idle water.

MONTENEGRO

Montenegrin model and wind energy generation systems

Over the years, Montenegro has started to implement new technologies related to wind energy and other renewable energy systems.

Wind and water renewable energy systems are at the core of Montenegro's renewable energy transformation. This shift to renewable energy relies on key IEC Standards.

Several IEC Technical Committees develop international standards for renewable energy systems. IEC TC 88 prepares standards for wind energy generation systems including wind turbines, wind power plants (onshore and offshore) and interaction with the electrical system(s) to which energy is supplied.

The IEC 61400 series of standards are published by IEC TC 88. These standards provide the basis for design, quality assurance and technical aspects for certification. The standards address site-specific conditions, all systems and subsystems of wind turbines and wind power plants, such as mechanical, and electrical systems, support structures, control, and protection as well as communication systems for monitoring, centralized and distributed control and evaluation, implementation of grid connection requirements for wind power plants, and environmental aspects of wind power development.

The Montenegrin Institute of Standardisation formed Technical Committees for energy management systems and energy efficiency and adopted IEC Standards for wind generation systems.

Also, in Montenegro, wind energy generation systems have been set up in certain locations, in the coastal part of the country, as well as in the northern part. They produce significant amounts of electricity that exceed the operation of mini power plants.

NORWAY

Electrification of the Norwegian shipping fleet

Landstroemsforum is an NEK initiative for electrification of the Norwegian shipping fleet. The forum consists of key stake holders in the maritime business, such as ship owners, harbours, ferry route owners, environmental organizations and equipment manufacturers. The members meet regularly to discuss technical challenges related to the electrification of the fleet and have also started to publish papers.

A broad spectrum of stakeholders, including the authorities, manufacturers, organizations, and end-users, oversee the NEK-driven project. It is financed by Enova, an enterprise owned by the Norwegian Ministry of Climate and Environment. Enova invests over three hundred million dollars every year in solutions aimed at reducing greenhouse gas emissions in Norway, developing energy and climate technology and strengthening security of supply.

The challenge

Norway has the world's second longest shoreline, despite being only the 62nd largest country by area. Only Canada has a longer shoreline. The country's many fjords and islands stretch the shoreline to 100,910 kilometres, which is seven times longer than the shoreline of the United Kingdom. For this reason, many Norwegian roads rely on ferries to cross fjords and to reach the islands. In total, there are 129 ferry crossings connecting regional roads in Norway. In addition to this are all the public ferries owned by the municipalities, private ferries and ferry crossings between Norway and neighbouring countries.

Electric ferries

In 2018, two electric ferries began operating over the Sognefjord, which is one of the world's longest fjords. Since then, the number of electric ferry crossings has risen rapidly. By the end of 2021, the total number of electric ferry crossings will be 60. In addition, 25 ferry crossings are already planned to be electrified after 2021.

Probably the world's largest electric ferry

The ferry MF Bastoe Electric, which operates between Horten and Moss (across the Oslofjord), is 143 metres long and 21 metres wide. The battery capacity is 4.300 kWh and the charging connection system, which is automatic, has a capacity of 9.000 kW. The ferry can take up to 600 people and 200 cars. Due to international maritime safety regulations, the ferry must have diesel engines as a backup. It saves approximately six million litres of diesel fuel per year.

Standards for ships

Due to limited docking time (approximately 10 minutes), all charging systems for the ferries in the harbours need to be automatic. Because there are still a lot of developments and innovations in connection systems, the shore connection interface is not yet ready for standardization. All other installations on the ship are based on standards, such as the [IEC 60092 series for electrical installations in ships](#).

NEK identified a gap for a specific standard addressing the relevant type of batteries used for propulsion. For this reason, the NEK maritime committee, NK 18, has developed a Norwegian specification for batteries in ships. The specification, [NEK NSPEK 411](#), gives additional requirements to [IEC 62619](#) (for secondary cells and batteries containing alkaline or other non-acid electrolytes, and safety requirements for secondary lithium cells and batteries, for use in industrial applications) to cater for the marine environment. Earlier in 2021, the NEK NSPEK 411 was presented and offered to IEC to be further developed into an international standard. In addition, NEK has also started revision of the specification, which will further improve the proposal to IEC, and hopefully make the process to an international standard smoother and faster.

Standards ashore

The grid to charger connection is based on a Norwegian standard (NEK 399) for electrical systems and electronic networks. The lack of such a standard from IEC triggered NEK to start this project. Among the technical details, it specifies the interface between the grid owner and user.

Shore to ship installations

The main task has been to facilitate electricity from shore to ship when ships are in a harbour. This will reduce emissions of both CO₂ and NO_x. The Norwegian commercial fleet consists of approximately 3.500 ships. The electrical solutions in these ships vary greatly, as do their size and purpose. Today, there are approximately 120 shore to ship installations along the coast and several more are planned.

Results from Landstroemsforum

Decisions within the forum (decisions in principle) have been made for voltage level and frequency. Another decision covers the responsible interface between grid and harbour, as well as harbour and ship, which is an important condition for building business models.

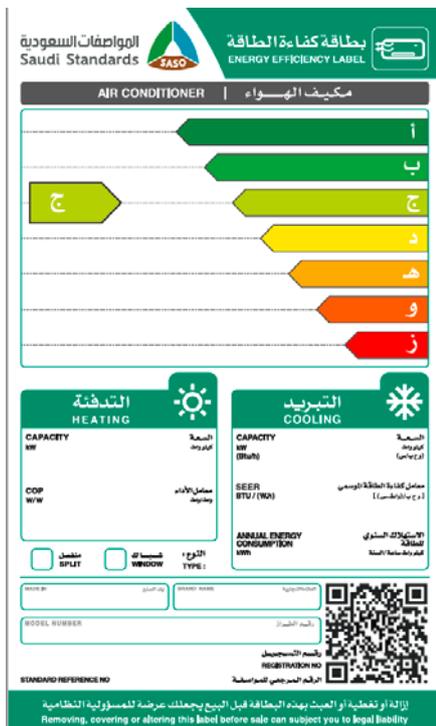
A guide to show relevant standards for shore connections has also been made. The guide is downloadable free of charge but is only available in Norwegian.

At the moment, the forum is working to finding a common solution for the automatic fast connections for ferries. Standardization in this area is still premature as a great deal of innovation is still occurring. Nevertheless, it's important to start the standardization process at an early stage in order to accumulate experience as the shipping business improves the solutions.

SAUDI ARABIA

Saudi Energy Efficiency Labels help reduce carbon emissions

Saudi Energy Efficiency Labels and Standards



One of the methods of reducing carbon emissions is through the implementation of energy efficiency programmes.

Saudi Standards, Metrology and Quality Org. ([SASO](#)) and Saudi Energy Efficiency Center ([SEEC](#)) have contributed with the relevant authorities under the Saudi Energy Efficiency Programme in developing standards and technical regulations to raise the use of energy efficiency labels.

The development of standards by the international standardization organizations IEC and ISO have facilitated the work for us, as we can use them as a reference source for determining requirements and test methods that have the international consensus. They make setting new requirements that could be different from one country to another redundant.

Those reference standards have been developed through international technical committees, in which experts and specialists from different countries around the world, especially the industry sector, participate in their work.

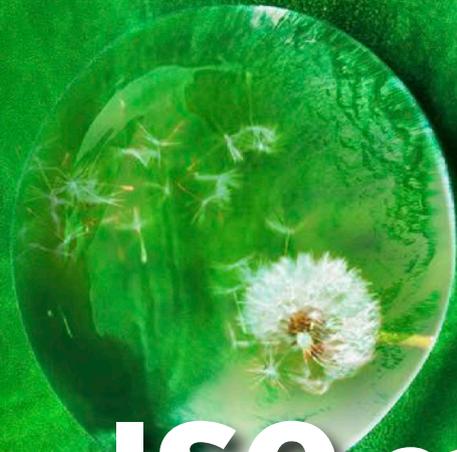
For example, the [IEC TC 59](#): *Performance of household and similar electrical appliances* Technical Committee sets performance requirements for household appliances that cover the requirements for measuring the energy efficiency of appliances. Currently, 8 subcommittees of IEC TC 59 are specialized in different types of household products, and they include performance requirements for dishwashers, heating equipment, laundry and cooking appliances, refrigeration, and others. These standards are considered a reference for energy efficiency standards in many countries that rely on them. They have been reviewed and developed to suit global requirements and the test results achieve consistently high accuracy.

Participants from more than 45 countries contribute to the work of these committees and have issued more than 130 standards for equipment performance requirements. These standards take into account performance requirements related to sustainability, such as noise measurement and energy efficiency of appliances.

Also, the [IEC TC 2](#): *Rotating machinery* Technical Committee has issued standards for measuring and classifying energy efficiency for electric motors that are used in a wide field in the industrial and residential sector and help reduce emissions from electricity generation.

ISO also has a role in issuing the measurement of energy performance for air conditioning by [ISO TC 86](#): *Refrigeration and air-conditioning* Technical Committee which issued standards suitable for testing methods for hot, medium and cold climates.

All these examples and others such as renewable energy standards show the important relationship between standardization and the environment.



ISO case studies

These case studies provide examples of where standards and other initiatives, both national and international, have provided solutions to issues related to climate change. The use of standards in public policy can help accelerate sustainability outcomes and support the world to achieve Net Zero at the earliest possible date.

| | |
|--|-----------|
| Bahrain (BSMD) – New regulation for energy-efficient air conditioners | 36 |
| Brazil (ABNT) – Promoting greenhouse gas inventories in SMEs..... | 38 |
| Canada (SCC) – Fighting floods in Canada’s North..... | 41 |
| Canada (SCC) – CarbonCure: Recycling CO ₂ to make greener concrete..... | 43 |
| China (SAC) – Developing standards for low-carbon equipment..... | 46 |
| France (AFNOR) – Investing in climate action with ISO 14097..... | 48 |
| Germany (DIN) – Standards to address climate change (SDG 13) | 52 |
| Iran (INSO) – Carbon footprint as a tool to limit greenhouse gases..... | 54 |
| Italy (UNI) – Supporting the EU’s climate change policy..... | 56 |
| Jamaica (BSJ) – Building national energy policy in Jamaica | 59 |
| Kenya (KEBS) – Energy-efficient air conditioners and refrigerators..... | 63 |
| Netherlands (NEN) – Keeping buildings cool in the Netherlands | 65 |
| Rwanda (RSB) – Reducing vehicle emissions through standards..... | 67 |
| Singapore (SSC) – Supporting water conservation in Singapore | 72 |
| Spain (UNE) – Decarbonizing the power sector with renewable gas | 75 |
| Spain (UNE) – Solar-thermal deployment supported by standards | 77 |
| Spain (UNE) – Taking energy efficiency a step further with standards..... | 80 |
| Sweden (SIS) – Public-private initiative for industrial climate transformation..... | 83 |
| United Kingdom (BSI) – Standards supporting UK ambitions to net zero | 85 |
| United Kingdom (BSI) – Faraday Battery Challenge Standards Programme | 87 |
| Zimbabwe (SAZ) – Promoting energy and water management in industry | 90 |

BAHRAIN

Bahrain Standards and Metrology Directorate (BSMD) New regulation for energy-efficient air conditioners

Overview

In Bahrain, expansion in the areas of infrastructure, new cities, industrial and commercial projects is leading to increased urbanization and development, thereby driving the demand for energy in the region. In the country's air-conditioning market, split and centralized air conditioners have experienced tremendous growth. Bearing in mind the current needs, Bahrain's climate change adaptation efforts have focused on mainstreaming climate change risks into the national planning framework, raising public awareness, implementing climate adaptation measures and putting in place an effective monitoring and evaluation system to track progress.

In this spirit, the Regulation on Energy Labelling and Minimum Energy Performance Requirements for Air Conditioners was released to regulate energy efficiency in the country. Based on a star-rating system, it oversees the minimum energy efficiency of air conditioners sold in Bahrain and helps consumers make energy-efficient choices when purchasing an air-conditioning appliance. The scope of the regulation covers single-package (such as window type) and split-system non-ducted air conditioners using air- and water-cooled condensers and heat pumps employing air-cooled condensers and ducted air-conditioners using air-to-air heat pumps for the residential, commercial and industrial sectors.

Led by the Bahrain Standards and Metrology Directorate (BSMD), within the Ministry of Industry, Commerce and Tourism (MOICT), the Regulation's development involved the participation of a number of stakeholders, including the Bahrain Chamber of Commerce & Industry (BCCI), the Sustainable Energy Authority of Bahrain (SEA) and local manufacturers and importers. In addition, it was examined by World Trade Organization (WTO) members before coming into force in 2016.

A year later, in 2017, the National Energy Efficiency Action Plan (NEEAP) was endorsed and launched by the Cabinet of Bahrain. The Plan sets the national energy efficiency target of 6 % by 2025 and proposes a total of 22 initiatives to achieve it and unlock the energy efficiency potential in the Kingdom. These initiatives cover all sectors of the economy and target efficiency improvements in both energy supply and demand. The Regulation was included as an initiative in this action plan. NEEAP also represents the Kingdom's efforts to deliver the sustainable energy transition envisioned in its

Economic Vision 2030. It embodies Bahrain's international commitments under the Paris Agreement, the United Nations Sustainable Development Goals, and the League of Arab States Renewable Energy Framework.

Outcomes and benefits

The NEEAP, which encompasses the Regulation, helps Bahrain stimulate more efficient electricity use and optimize the use of indigenous gas resources. It also aims to reduce peak electricity demand and promotes investment, employment and innovation in energy-efficient products and services. The expected outcomes from the NEEAP are a reduction in greenhouse gas emissions while making the economy more competitive and improving energy security in the long-term.

Achieving the 6 % energy efficiency target will result in:

- Energy savings of 5 800 GWh on a primary energy equivalent basis by 2025
- Cumulative government monetary savings of BHD 82 million
- Investment savings of BHD 172 million in electricity generation
- An anticipated financial impact of BHD 230 million (minus implementation costs)
- A cumulative reduction of 3.4 million tonnes of CO₂

Partners involved

The Bahrain Energy Efficiency Labelling Scheme was set up as a joint task between the Ministry of Industry, Commerce and Tourism (MOICT) and the Electricity and Water Authority (EWA). In 2015, the Regulation on Energy Labelling and Minimum Energy Performance Requirements for Air Conditioners was approved by the National Committee for Standards and Metrology of the Kingdom of Bahrain.

Timeline

The Regulation took almost a year to complete, including the WTO Technical Barriers to Trade Notification and the commenting period of the Bahrain Chamber of Commerce and Industry (BCCI). The basis for the document was Saudi Standard SASO 2663, *Energy Labelling and Minimum Energy Performance Requirements for Air Conditioners*, which was amended to suit national needs. Registered under Ministerial Order No 70, the Regulation was published in the Official Gazette, No 3223, in August 2015 and came into force in the Kingdom six months later in February 2016. In 2020, the Bahrain standards body BSMD, in cooperation with the Gulf Standardization Organization (GSO), launched a new online platform and procedure for the registration of energy-efficient products.

References

- Ministerial Order No 70 of 2015 with respect to air conditioner technical requirements
- Sustainable Energy Unit (SEU), [The Kingdom of Bahrain National Energy Efficiency Action Plan \(NEEAP\) – Executive Summary](#) (January 2017)

BRAZIL

Associação Brasileira de Normas Técnicas (ABNT) Promoting greenhouse gas inventories in SMEs

Overview

Back in 2012, Brazil's national standards body (ABNT) in partnership with the Inter-American Development Bank (IDB), launched an initiative designed to promote greenhouse gas (GHG) inventories and third-party verification in Brazilian SMEs. The main objective of the project was to provide SMEs with technical support to prepare emissions inventories and identify opportunities to improve their processes. This was in addition to ABNT obtaining its accreditation as a verification body for corporate inventories, in accordance with internationally accepted standards and protocols. Before the start of this project, voluntary greenhouse gas initiatives in Brazil had only involved large companies. Now, for the first time, resources were made available to assist SMEs in training staff and implementing a GHG management system.

The project trained up professionals to work with SMEs in compiling their emissions inventories, in collaboration with several important Brazilian institutions such as INMETRO (metrology and industrial quality), INEA (environment) and SENAI (industrial training). The scheme included training on GHG standards ABNT NBR ISO 14064 and ABNT NBR ISO 14065 as well as on GHG protocols, with a particular focus on the Brazil GHG Protocol Program. This was the first time that lead verifiers in GHG emissions inventories had been trained up in Brazil.

Seminars were held across the country to get companies to actively participate in the project by preparing their own GHG inventories and emissions reduction initiatives. Another positive development was the creation of two methodological guides to assist companies in their efforts. The first described how to conduct a GHG inventory while the second looked at actions that can be taken to reduce GHG emissions. It also explained how to optimize an organization's management processes to reduce energy consumption and operating costs.

In the final phases of the project, a number of seminars were conducted on the subject of knowledge transfer. These were run in conjunction with the National Institute for Standardization (INN) in Chile, INDECOPI in Peru, the IDB in Washington, the Ministry of Environment and IDB in Panama, and the Ministry of Environment and Colombian Institute of Technical Standards and Certification (ICONTEC)

in Colombia. A prospective study on the behaviour of countries and companies in relation to climate change was also carried out across Latin America.

Outcomes and benefits

The world economic context is critical to a country's climate strategy and the progress of the GHG inventories initiative was affected by external economic factors. But the signing of the Paris Agreement in 2015, along with increased involvement of countries like the United States and China, brought renewed focus to the project.

Brazil has always been a leader among developing countries in matters of climate action and emissions reduction targets. Over the years, the country has strengthened its national climate policy, calling for more active participation of companies, especially with respect to inventories and mitigation projects. ABNT and the IDB believe this project will contribute to reinforcing Brazil's leadership in climate action and get companies to modernize their environmental approach.

The GHG project was positive in many respects:

- In addition to the first group of lead GHG verifiers, Brazil managed to train up more than a hundred professionals.
- Equipped with better tools, such as methodologies and case studies, as well as newly acquired skills, SMEs became more proficient in developing new mechanisms in pursuit of a low-carbon economy.
- ABNT obtained its accreditation as a verification body for corporate inventories, in accordance with internationally accepted standards and protocols.

For ABNT, this project should serve as an example and foundation for the development of actions aimed at strengthening Brazil's sustainability awareness in the future. With its accreditation as Verification Body (OVV) of GHG Inventories under the Brazilian Conformity Assessment System, ABNT makes available to companies of all sizes and sectors another service within the "ABNT brand of excellence".

Partners involved

Requesting organizations:

- Associação Brasileira de Normas Técnicas (ABNT)
- Inter-American Development Bank (IDB)

Supporting organizations:

- Agência Brasileira de Desenvolvimento Industrial (ABDI)
- Banco Nacional do Desenvolvimento (BNDES)
- Confederação Nacional da Indústria (CNI)
- Federação das Indústrias do Estado de São Paulo (FIESP)
- Financiadora de Estudos e Projetos (FINEP)
- Federação das Indústrias do Estado do Rio de Janeiro (FIRJAN)

- Instituto Nacional de Metrologia, Qualidade e Tecnologia (INMETRO)
- Ministério do Meio Ambiente (MMA)
- Serviço Brasileiro de Apoio às Micro e Pequenas Empresas (SEBRAE)
- Universidade do Estado do Rio de Janeiro (UERJ)

Timeline

The project ran over a four-year period from 2012 to 2016.

References

- Methodology for GHG inventories and emissions reduction
- Methodology for actions to reduce emissions and process optimization

CANADA

Standards Council of Canada (SCC)

Fighting floods in Canada's North

Overview

Flooding is a huge challenge across Canada, where it has emerged in the last decade as the costliest disaster due to extreme weather. That is no different in the North, where flooding, brought on by climate-fuelled extreme weather, can impose high costs on small communities. Community leaders and their insurers are looking for ways to avoid disaster and make their communities safer and more resilient in the face of battering storms.

In 2011, in partnership with CIRNAC, the Standards Council of Canada (SCC) launched the Northern Infrastructure Standardization Initiative (NISI) to respond to the urgent impacts of climate change on buildings and infrastructure in Canada's North. Over five years, this programme facilitated the development of five new Canadian national standards including CSA S503 on community drainage in northern territories.

Building on the success of NISI, SCC launched the Standards to Support Resilience in Infrastructure Program in 2016. This broadened the scope of SCC's climate change adaptation activities to all of Canada. Northern communities remained an area of focus, with a stream of work dedicated as "NISI Phase II". This included new editions of standards developed under Phase I, to reflect lessons learned from the first five years of use and the latest climate data and adaptation practices.

For all the standards activities funded under the umbrella of NISI, topic selection was guided by the Northern Advisory Committee (NAC). The NAC is composed of representatives from the Northwest Territories – Nunavut, Yukon and Nunavik – as well as representation from CIRNAC. Given their experience and technical knowledge of the unique issues facing northern infrastructure and buildings, the NAC proposes topic areas for standardization and uses a consensus-based prioritization framework to rank and select project topics. The NAC has also championed the standards produced to date among northern communities, identifying opportunities for training, uptake and integration of standards into policy and other requirements.

Outcomes and benefits

Supporting efforts to create safer, more resilient communities is at the heart of CSA S503. This SCC-supported standard lays out the essentials for ensuring a community's drainage systems are up to the task, specifying minimum planning, design and maintenance requirements and considering the unique needs of northern communities. Drainage planning is widely recognized as a primary means of community climate change adaptation because flooding can cause damage to roads and buildings and deteriorate the stability of permafrost. Flooding results in the need for increased maintenance, which affects operating budgets and compromises the safety of the community. By following this standard, communities can improve their ability to manage existing drainage challenges, address existing deficiencies, and prepare for future weather events.

Since this standard was first published in 2015 (and updated in 2020), it has been implemented in numerous communities across Nunavut, including Clyde River, Kugluktuk, Cape Dorset, Hall Beach, and Rankin Inlet.

“We are currently tackling drainage planning in multiple communities across Nunavut. Drainage planning is of utmost importance for community climate change adaptation in the North because it protects buildings and infrastructure by improving the stability of underground permafrost, thereby reducing the risk of soil sinking, and by reducing the costly impacts of intense floods during the annual spring melt and during summer storms. Having this standard means we can be certain that projects carried out by different suppliers at different sites – often separated by great distances – will all meet a similar standard. That gives us greater peace of mind that we are doing everything we can to keep our communities as safe as we can from the threat of climate change.”

– William Patch (Manager, Community Planning, Government of Nunavut)

The standard provides a go-to reference for governments in Canada's North that can be incorporated into policy and regulation. It is referenced by the Société d'habitation du Québec's *Housing Construction in Nunavik – Guide to Good Practices*, by the government of Nunavut's *Good Building Practices – Guidelines*, and by the government of the Northwest Territories' *Good Building Practice*. These design guides supplement the national building codes and represent progress towards mandating the use of the voluntary standard, leading to reductions in flood risks for northern communities.

Partners involved

Requesting organizations:

- Standards Council of Canada (SCC)
- Crown Indigenous Relations and Northern Affairs (CIRNAC)

Supporting organizations:

- Representatives from the Northwest Territories – Nunavut, Yukon and Nunavik

Timeline

Development of CSA S503, *Community drainage system planning, design, and maintenance in northern communities*, began in October 2012 and the first edition was published in January 2015. A second edition was later developed, beginning in March 2019, and was published in November 2020, superseding the first.

References

- [CSA S503:20](#), *Community drainage system planning, design, and maintenance in northern communities*
- [SCC NISI 100 Guides](#)
- SCC, *Standards in Action: Building a Climate Resilient Future (report)*, 2021
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- Government of the Northwest Territories, [Good Building Practice](#)

CANADA

Standards Council of Canada (SCC)

CarbonCure: Recycling CO₂ to make greener concrete

Overview

Technology that turns waste carbon into usable concrete holds great promise in the fight against climate change. In line with its net-zero carbon objectives, the Canadian government is showing leadership in the procurement of low-carbon building materials, including cement and concrete products. As part of this initiative, it has recognized technologies that can significantly reduce carbon dioxide emissions in the concrete and cement sector, such as carbon capture, usage and storage.

In May 2021, the Government of Canada and Cement Association of Canada announced a partnership to support the decarbonization of the sector. In its news release, the government recognizes CarbonCure, a Carbon XPRIZE winner and Global Cleantech 100 recipient, as a unique technology to permanently store carbon in concrete.

Based in Nova Scotia, CarbonCure Technologies Inc. is on a mission to decarbonize concrete and reduce emissions associated with building materials. Its patented technology permanently sequesters or “locks in” carbon dioxide by injecting it into concrete as it is mixed. This makes for a concrete product that meets or exceeds the benchmarks for quality and strength, while decreasing greenhouse gas emissions and lowering manufacturing costs.

In order to expand, CarbonCure needs its revolutionary technology to be recognized in the relevant industry standard as one of the acceptable methods for producing concrete. To this end, Standards Council of Canada (SCC) is helping the company get the existing standard updated with the addition of a new annex endorsing the CarbonCure system. The revised standard, which allows for the use of injected carbon dioxide in cement, is referenced in the National Model Construction Codes as well as in provincial and territorial adoptions of the Codes.

Outcomes and benefits

As part of this initiative, SCC is also helping CarbonCure take part in international standardization by facilitating an opportunity to sit as an observer on relevant European technical committees for concrete specifications. This will be incredibly valuable because it will support CarbonCure’s entry and expansion into European markets.

Overall, this initiative will be instrumental in helping Canada establish itself as a leader in the field of innovative carbon technologies on the world stage. By encouraging technical alignment within major European markets and allowing Canadian stakeholders to participate in European decision-making forums, SCC is supporting government priorities by leveraging international relationships and providing growth opportunities for Canadian businesses.

Partners involved

As part of this project, Standards Council of Canada engaged with the Cement Association of Canada, CarbonCure, the National Research Council of Canada, and accredited standards development organization CSA Group.

SCC is a member of the Clean Growth Hub, a free service by the Government of Canada that supports advancement in clean technology through the federal ecosystem. Thanks to its Innovation Initiative, SCC connects directly with clean tech companies to develop a customized standardization strategy and examine funding possibilities to support their projects.

Timeline

SCC first engaged CarbonCure under the Innovation Initiative in early 2017 and provided strategic advice. This led to an amendment to the relevant industry standard, which was published in June 2018.

References

- Government of Canada and Cement Association of Canada [news release](#)
- [The Innovation Initiative](#) (Standards Council of Canada)
- [Clean Growth Hub](#) (Government of Canada)
- Trade Commissioner Service [case study](#) (Government of Canada)
- [CSA Group](#)

CHINA

Standardization Administration of China (SAC) Developing standards for low-carbon equipment

Overview

Energy conservation as it relates to the fight against climate change has always been a top priority for China's sustainable development. With growing policy emphasis on improving energy efficiency and reducing environmental pollution and carbon emissions, the country has implemented a series of new minimum energy performance standards to improve appliance energy efficiency.

The Standardization Administration of China (SAC) has taken many productive measures to actively develop national standards that address climate change. Standards play a key role in the country's energy policy by promoting standardized technical specifications that form the basis for new green technologies, products and methodologies. These have proved effective for energy saving and carbon management and are widely accepted both in China and around the world.

SAC's standards portfolio currently contains 73 standards for minimum energy performance of end-use equipment spanning almost the whole gamut of end-use household appliances as well as most common commercial and industrial equipment. Similarly, the national suite of standards for energy intensity of industrial products totals 111 deliverables. These cover a broad range of products from China's main industrial sectors, including the oil industry, iron & steel, chemical engineering, power plants, non-ferrous metal, and coal. In addition, over three hundred voluntary standards for energy conservation offer an essential complement to these standards.

In the area of greenhouse gases, China has also published 16 national standards for the accounting and reporting of greenhouse gas (GHG) emissions since 2015. These cover 12 typically polluting industrial sectors such as iron & steel, chemical engineering, building materials, power plants, non-ferrous metal, the coal industry and civil aviation.

The main stakeholders involved in the development and implementation of these standards are governmental agencies, relevant industry associations, universities and research institutes, testing laboratories, and certification and accreditation bodies. The standards will be referenced when making specific technical requirements in regulation/legislation.

Outcomes and benefits

Both energy conservation standards and standards for GHG emissions accounting have made a significant contribution to China's climate action by promoting technologies, equipment, products and methodologies that are environmentally friendly and effective. These have resulted in substantial energy savings and a reduction in GHG emissions in the industrial production process and the end-use product sectors in China.

Partners involved

Requesting organizations:

This standards development initiative was launched by the Standardization Administration of China (SAC) in conjunction with relevant government agencies. SAC works in collaboration with the National Development and Reform Commission (NDRC) to develop national standards for energy conservation. Its greenhouse gas accounting standards are produced with the participation of the Ministry of Ecology and Environment (MEE).

Supporting organization:

The China National Institute of Standardization (CNIS) provides the requesting organizations with technical support in devising the plan and programmes for standards development and ensures these are followed when developing and maintaining standards for energy conservation and GHG emissions accounting.

Timeline

China has been publishing mandatory national standards for energy conservation of equipment since the late 1980s, branching out towards industrial products in 2007. More recently, in 2015, it began developing standards for the accounting and reporting of greenhouse gases.

References

- Law of the People's Republic of China on Conserving Energy
- Opinions on Strengthening Energy Conservation Standardization Work (released by the General Office of the State Council)

FRANCE

Association française de normalisation (AFNOR)

Investing in climate action with ISO 14097

Overview

Many financing or investment activities will either have an impact on climate change or be affected by it. This dual impact is known as *double materiality*: climate change affects the value of a company while a company's activities can impact the climate by reducing greenhouse gas (GHG) emissions in the real economy. This in turn reduces a company's vulnerability to the impacts of climate change, increasing its resilience. The project carried out by AFNOR, France's national standards body, looked at the use of ISO 14097 as a means of responding to the pressing need for a robust, harmonized framework for disclosures on climate-related risks.

To achieve the goals of the 2015 Paris Agreement and maintain stability in the financial system, the world needs to transition to a low-carbon, climate-resilient economy. This transition requires a vast reallocation of investee capital, ranging from high-carbon to low-carbon assets, assets with negative emissions and assets that are resilient in the short, medium and long term.

In addition to financing an already decarbonized or low-carbon activity (e.g. in the area of renewable energies), it is also important to finance the decarbonization of GHG-emitting sectors as a part of a climate finance scheme that contributes to climate change mitigation. Financing the transition to a low-carbon climate should be seen as a way of financing businesses that are on the path to achieving the Paris Agreement reduction targets.

As green investments expand across borders, transition pathways aligned on the Paris Agreement can differ from region to region and from country to country, depending on the industrial structure and/or role played by each in the global value chain. Therefore, "financing for a transition" should take an inclusive and flexible approach that can be adapted to the particular circumstances of each country or region without excluding specific sectors, industries or technologies from its scope.

Financiers play a key role in this transformation because their every-day decisions can influence the behaviour of investees (companies, clients and borrowers) in the real economy. Their influence covers capital and research & development expenditure plans, the decision to retire (or not) high-carbon assets, as well as other aspects of corporate strategy. Moreover, because they simultaneously wear the hats of creditor, financial advisor and asset manager, financiers have a broad influence over

their clients' investments. For this reason, a financier's day-to-day decisions can have both positive and negative consequences on climate goals.

Most financiers manage their assets without any specific objective or climate-related strategy. Their decisions and actions can therefore affect investees that have an impact on the climate and expose them to climate-related risks. Any resulting effects, which may be deemed unintentional, can have positive or negative consequences for both the climate and the financiers' assets. This category of financiers is referred to as "financiers *without* climate objectives".

In contrast, some financiers explicitly support climate goals by defining clear objectives or specific strategies related to climate action; this category is referred to as "financiers *with* climate objectives". These financiers influence investees through climate actions that enhance climate change mitigation or adaptation, including but not limited to:

- Using voting rights associated with share ownership
- Using their influencing power as creditors
- Setting conditionality associated with lending or security issuance
- Making preferential financing available for targeted activities that face a financing gap
- Conducting policy advocacy

The active role of the financial industry in supporting international efforts for climate action is acknowledged in Article 2.1c of the Paris Agreement and borne out by the following (non-exhaustive) list of organizations and initiatives:

- United Nations Environment Programme (UNEP) Inquiry
- Non-State Actors Zone for Climate Action (NAZCA), an online portal hosted by the United Nations Framework Convention on Climate Change (UNFCCC)
- Organisation for Economic Co-operation and Development (OECD)
- G20 (Green Finance Study Group)
- European Commission, through its publications:
 - *Action Plan on Financing Sustainable Growth* (2018)
 - *Guidelines on Reporting Climate-related Information* (2019)
 - *Non-Financial Reporting Directive* (2014)
 - *Non-Binding Guidelines on Non-Financial Reporting* (2017)
- Network for Greening the Financial System (NGFS)
- UN Principles for Responsible Banking
- UN-convened Net-Zero Asset Owner Alliance

Outcomes and benefits

In this context, ISO 14097, *Greenhouse gas management and related activities – Framework including principles and requirements for assessing and reporting investments and financing activities related to climate change*, provides principles, requirements and guidance to define, monitor, assess and report on the actions of financial institutions as they relate to climate change and contribute to achieving the Paris Agreement climate goals. The framework can be applied both by financiers *with* or *without* climate objectives.

The standard helps financiers assess and report on their actions and see the real value of their contribution to the climate goals. It enables them to:

- Establish a climate strategy and plan to achieve its climate objectives
- Identify climate actions that support the achievement of their objectives
- Identify, assess and manage exposure to climate-change-related risks and opportunities
- Be recognized by making an evidence-based claim about their mitigation/adaptation impact in the economy

Possible use cases include measuring the impacts of financiers' actions related to initiatives such as Climate Action 100+ and assessing the option of replacing Board members with directors amenable to climate action.

Potential impacts and benefits of ISO 14097

| | Impacts | Examples of organizations or companies that could be interested |
|-------------------|---|---|
| Financiers | Financial institutions will be able to assess, set targets and communicate on climate actions. Financiers can use the standard to measure the impact of their corporate engagements. | In the context of the PRI Montreal Pledge, the UNEP Portfolio Decarbonization Coalition and the UNFCCC NAZCA platform, more than 440 financial institutions are committed to reporting on climate and/or set targets. Financiers involved in the Climate Action 100+ can use the standard to measure the impact of their corporate engagement. |
| Corporates | Corporates will know what the expectations of their shareholders are in relation to measurement and reporting of climate action impacts. | Where shareholders can successfully file a motion requesting the inclusion of climate-sensitive Board members on the Board of directors, the impact can be measured. |

| | Impacts | Examples of organizations or companies that could be interested |
|---------------------------------------|--|--|
| Government | Policy makers will be able to develop mandatory disclosure requirements, negotiate commitments with private financial institutions, and set targets for public financial institutions. | The governments of France, Switzerland, Sweden and California (USA) have already initiated actions in this direction. There are more and more voices advocating mandatory disclosure of exposure to climate-related risks and benefits. UNEP FI supports the setting and communication of voluntary targets. |
| Academic and research bodies | Researchers will be able to assess the consistency of financial markets with climate goals and related risks for financial stability. | Climate Policy Initiative, Germanwatch, WRI, Frankfurt School of Finance, University of Zurich. |
| Non-governmental organizations | Civil society will be able to track the climate performance of the finance sector. | Banktrack, RAN, CAN, WWF, Greenpeace, Ceres/INCR, etc. |

Partners involved

Requesting organization:

- Association française de normalisation (AFNOR)

Supporting organization:

- United Nations Framework Convention on Climate Change (UNFCCC)

Timeline

ISO 14097 was developed over 48 months and published in May 2021.

GERMANY

Deutsches Institut für Normung (DIN) Standards to address climate change (SDG 13)

Overview

Protecting the climate and adapting to its changes will be top of the agenda in decades to come. Based on scientific model calculations, the diverse national and multinational agreements form a political framework that should allow us to achieve our climate protection goals (United Nations Paris Agreement, 2015).

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, comprises at its heart 17 Sustainable Development Goals (SDGs) that act as an urgent call for action by all countries in the global partnership. In particular, SDG 13 (Climate Action) urges us to take action to combat climate change and its impacts on the world. Likewise, the European Commission's European Green Deal is striving to transform Europe into the world's first climate-neutral continent.

Building on these political intentions, technical measures and social action are the main factors that can contribute to climate change mitigation. Simply put, this involves taking steps to prevent or reduce the release, use or unsustainable disposal of greenhouse gases. Adaptation measures will also be required to lessen the consequences of climate change, for example through the development of new technologies in sustainable water management or by promoting circular economy concepts for the textile and timber industries. Standardization plays a vital part in helping stakeholders in the political, industrial and social arenas identify relevant practices and products that support these measures.

The project launched by Germany's standards institute, DIN, in early 2021 has two main objectives:

- Identify existing international, European and national standards that may contribute to the fight against climate change
- Perform a gap analysis of standardization needs and create a roadmap to help stakeholders identify specific areas that are insufficiently represented in standards development so far

The project is limited to national standards committees working in the timber and furniture industries, textiles and textile machinery, water management, and technical fundamentals. However, results will be shared with other standards committees with a view to launching similar initiatives in other areas of work.

Outcomes and benefits

Of the two thousand or so deliverables that make up the DIN portfolio, about five hundred have legal relevance, most of which in the context of German and European environmental law. These can be assumed to be directly or indirectly linked to climate-relevant aspects, including soil and water protection, CCS (carbon capture and storage), biodiversity, the circular economy, and so forth.

Among the best approaches to combat climate change and its impacts, participating in standardization is shown to be a strategic move for any stakeholder group, be it in the realm of industry, research, politics or public interest. Taking an active part in standards development work helps introduce technologies and ideas into standards while, at the same time, ensuring that safety, environmental and consumer protection and occupational health are given due consideration. Moreover, innovations that have been brought to the standardization process have been more likely to be successful once they reached the market. By mapping existing standards and uncovering gaps in the framework, the project helps stakeholders better link standardization to market and political needs.

Partners involved

The German Standardization Strategy puts strong emphasis on environmental issues, consumer protection, healthcare and the safety of buildings as essential targets that must continue to be met. Rising to the challenge, DIN's technical subgroup "Resources and Technology" launched this wide-scale project which covers international, European and national standards.

Timeline

The goals and scope for this project were approved in late 2020 and the project was launched in January 2021. It is expected to be completed by the end of the year.

References

- United Nations Paris Agreement, 2015
- United Nations Sustainable Development Goals, 2015
- European Commission, European Green Deal, 2019
- European Union, [Sustainable development in the European Union – Overview of progress towards the SDGs in an EU context](#), 2020, 44 pp.

IRAN

Iran National Standards Organization (INSO) Carbon footprint as a tool to limit greenhouse gases

Overview

Iran is experiencing unprecedented climate-related problems such as drying of lakes and rivers, dust storms, record-breaking temperatures and long-running droughts. Yet despite the generally low precipitation, the country has also recorded intensive floods. As a signatory to the Paris Agreement, Iran has pledged a 4% cut in emissions by 2030 relative to business-as-usual, or above if given international support. To meet this target, it needs practical policies to cut CO₂ emissions intensity in power generation and the manufacturing of products and services.

That is why INSO, the Iranian national institution for standardization, has developed a standard for calculating the carbon footprint of products (CFP). It used as a basis for its work ISO 14067, *Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification and communication*, the International Standard that helps evaluate the carbon emissions embodied in product value chains and the role of life-cycle assessment in curbing them.

Published in 2019, the national standard details principles, requirements and guidelines for the quantification and communication of CFPs based on greenhouse gas (GHG) emissions and removals over the life cycle of a product. Requirements and guidelines for the quantification and communication of a partial carbon footprint of products (partial CFP) are also provided. Communication of the CFP to the intended audience is based on a CFP study report that provides an accurate, relevant and fair representation of the CFP.

All organizations, governments, communities and other interested parties can benefit from providing clarity and consistency in quantifying and communicating their carbon footprint. Examples of organizations that already apply this standard are producers, owners and commissioners of the CFP study.

Organizations may wish to communicate a CFP for many reasons, which may include:

- Providing information to consumers for decision-making purposes
- Enhancing climate change awareness and consumer engagement on environmental issues
- Demonstrating an organization's commitment to tackle climate change
- Supporting the implementation of policies on climate change management

In addition to the total number of CO₂-eq emissions from the product process, the standard helps quantify emissions from the treatment of fossil and biogenic carbon, electricity use, or occurring as a result of direct land use change, soil carbon change and carbon storage in products. It also covers aircraft emissions, as well as non-CO₂ emissions and removals from livestock, manure and soils.

The standard is currently for use on a voluntary basis but, because of the amount of greenhouse gas emissions in different products, there is an urgent call to make it mandatory. The issue is being studied in the National Working Group on Climate Change in order to create the essential infrastructure and policy that will allow its mandatory application.

Outcomes and benefits

The publication of this national standard means a step forward in GHG quantification by using a new range of system boundaries, but also because it provides transparent communication and comparison. Though recently published, it is already making a difference and has been considered an important tool for obtaining a reliable indication of areas in which greenhouse gases can be reduced.

By establishing a recognized reference framework, the standard provides a transparent quantification and reporting of GHGs “from cradle to grave” – that is, throughout the whole life cycle of the product. This helps to discern which stage is responsible for most of the emissions and provides valuable information on how to correctly identify opportunities for improvement, such as alternative product design or sourcing options, production and manufacturing methods, raw material choices, recycling and other end-of-life processes. It also makes tracking the performance of these GHG reduction strategies easier to manage.

Carbon footprint is becoming popular to differentiate products in a competitive market. Hence, providing correct and consistent communication of CFPs is supporting the comparability of products in a free and open market. It also makes reliable and comparable parameters available to consumers, who are encouraged to contribute to GHG reductions through improved purchasing, product use and end-of-life decisions.

Partners involved

Iran’s national standard for the carbon footprint of products was developed by INSO in collaboration with the Department of Environment and other relevant organizations, such as the Civil Aviation Organization, Ministry of Agriculture, Ministry of Oil and Ministry of Energy.

Timeline

The standard was in development for about a year before being published in 2019.

References

- [ISO/TC 207/SC 7](#), *Greenhouse gas management and related activities*

ITALY

Ente Italiano di Normazione (UNI)

Supporting the EU's climate change policy

Overview

Anthropogenic climate change is widely recognized as a major challenge compelling us to commit to broader, more ambitious actions within a limited time frame. There is currently a discernible trend for developing ISO standards that address climate change, with active involvement of the European Union (EU) at the level of individual countries. But international standardization doesn't always provide the answer to all European needs, which is why regional coordination through a dedicated technical committee is extremely useful.

With this in mind, the European Committee for Standardization (CEN) recently established a new technical committee with the aim of developing frameworks, requirements and guidance to support the EU's policies on climate change. The EU has always been a frontrunner when it comes to implementing climate policy, so CEN/TC 467, *Climate change*, has the potential to make a big difference in this area.

In this context, voluntary standards must be able to support the full implementation of the EU's mandatory framework, enhancing synergies at the national and European levels. To strengthen these synergies, a decision was made to start mapping the mandatory and voluntary carbon management frameworks existing within the EU in order to clarify their relationships. This resulted in Workshop Agreement CEN/CWA 17675, published in March 2021, which gives a general overview of the legislative framework and its links to standardization. The new document provides a clear and definitive mapping of tools for carbon management within the European Union.

Outcomes and benefits

Implementing the European Green Deal policy initiative by 2030 will require the development of political and technical tools, and standardization will play a crucial role in this respect. This is why CEN/TC 467 is crucial for tackling standards work in the field of climate change mitigation and adaptation, and their related social and economic aspects.

ISO standards currently do not support organizations in setting mitigation targets, nor do they help flesh out associated strategies and action plans. Meanwhile, there is a growing interest from

companies wanting to set themselves greenhouse gas (GHG) reduction targets in accordance with recognized international initiatives such as SBTi or ACT. Climate change mitigation standards may therefore be useful in helping EU companies meet their carbon reduction targets in line with the 2015 Paris Agreement.

Adaptation standards are equally important when it comes to tackling climate change and local authorities have a central role to play in increasing EU resilience. Having a common technical standard to facilitate the exchange of experience and knowledge is therefore essential in order to get maximum results for minimal resources and effort.

Objectives such as revising the Emissions Trading Scheme (ETS), reducing national emissions for sectors outside the ETS, or changing land and forestry use for long-term climate change mitigation, can be achieved more easily if the mandatory and voluntary regulatory framework is clear and well defined. CEN/CWA 17675 is a good place to start to realize these objectives. It helps maximize the effectiveness of GHG mitigation actions, facilitate climate change adaptation and make the path established by EU policies interact with market dynamics.

From the Kyoto Protocol to the EU Emissions Trading System and the European Green Deal, from the environmental footprint of products and organizations to sustainable finance as mandatory policies, this document identifies possible synergies with EN ISO 14064, EN ISO 14065 and EN ISO 14067 – a suite of standards on greenhouse gases – after providing a mapping of greenhouse gas emissions in Europe by sector. CEN/TC 467 seeks to promote broader, more effective collaboration between EU national standards bodies, maximizing synergies and avoiding overlap. To this end, it maintains close cooperation with the relevant ISO technical committee on greenhouse gas management (ISO/TC 207/SC 7).

CEN/CWA 17675 is applicable to industry, commerce, service providers and their suppliers, academic and research bodies, standards application businesses such as testing laboratories, certification bodies, consumers and government, in particular agencies dealing with environmental safety. All stakeholders are invited to take part in the activities of CEN/TC 467 and provide their contribution and viewpoint. This will ensure that standards are more effective going forward and take into consideration the needs, expectations and experiences of national members as well as progress made in implementing the European Green Deal.

CEN/CWA 17675 can support EU policy makers in developing future climate legislation as well as helping international accreditation and verification bodies find their way around the European normative framework. It also holds the potential to help market players take stock of the climate action tools at their disposal. Ultimately, the new Workshop Agreement can assist organizations in meeting their climate goals and navigating the articulated European legislative and regulatory framework.

Partners involved

Published in March 2021, CEN/CWA 17675 was based on a proposal from UNI, with the support of other national standards bodies, such as DIN (Germany) and BSI (UK), and European companies including JRC, ADEME and CLEOPA.

Timeline

Technical committee CEN/TC 467, *Climate change*, was created in November 2020 at the initiative of UNI, with the aim of supporting EU policies on climate change. The proposal for a CEN Workshop Agreement was presented in June of that year and resulted in the publication of CEN/CWA 17675 on 17 March 2021.

JAMAICA

Bureau of Standards Jamaica (BSJ)

Building national energy policy in Jamaica

Overview

As the world moves to address the challenge of climate change, Jamaica remains committed to making its own contribution with a new energy efficiency building code and energy labelling programme. In line with the requirements of the Paris Agreement, the country has increased its ambitions for the mitigation component of its Nationally Determined Contribution (NDC). This increase comprises both a broader sectoral scope and the delivery of greater emissions reductions following the identification of new opportunities to cut emissions in the energy sector.

The Jamaica National Energy Policy 2009-2030 aims to design and implement cost-saving measures to boost energy efficiency and conservation in the country. This strategic document places priority and emphasis on the development of renewable energy sources, such as solar and hydroelectricity, relative to economic feasibility, carbon abatement and the diversification of fuels based on efficiency and environmental considerations.

Jamaica adapted the International Code Council's Energy Conservation and Efficiency Code (IEECBC) in 2009 through a partnership between the Bureau of Standards Jamaica (BSJ) and the Jamaica Institution of Engineers (JIE). The process of adaptation began in 2003, and in 2019 the IEECBC was updated for Jamaica.

As a member of the CARICOM Regional Organisation for Standards and Quality (CROSQ), Jamaica participated in the work of the Regional Project Team for the Development of the CARICOM Energy Efficiency Building Code (EEBC) in 2018. The project started with a meeting at the BSJ offices in March 2017. The Code, which is based on the IEECBC, mandates design and installation specifications to reduce heat loads in buildings, thus reducing the energy requirements for cooling and improving the energy efficiency of residential and commercial buildings using a mix of recommendations for the building envelope. Minimum energy performance standards are included for forced ventilation systems such as central air-conditioning units.

The project was funded by the Global Environment Facility through UNEP (United Nations Environment Programme), with additional support from The Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH. Once completed, the Regional Energy Efficiency Building Code (REEBC) must

be adopted by each territory for application within its jurisdiction. Jamaica will be pursuing the adoption process until June 2022.

Another initiative involved the creation in 2017 at BSJ of a regional energy efficiency testing laboratory under World Bank funding. The laboratory's testing chambers have the capability for testing room air-conditioning units, domestic refrigerators, freezers and wine chillers. Three regional energy efficiency standards were also developed under the project, which set out the test methods to be employed for each appliance, as well as a labelling standard to complement the testing. Jamaica intends to adopt these standards within the next six months. The standards will be referenced under the Jamaica Standards Act.

A mandatory Energy Labelling Programme is being implemented by the National Compliance and Regulatory Authority (NCRA) based on the energy-labelling standard. The monitoring programme, which is expected to be fully implemented by January 2022, will see NCRA inspectors check the ports of entry and the domestic marketplace to ensure that all energy appliances bear the Jamaican energy label that informs customers of their energy use and potential annual use cost. Information on the energy labels is determined using the tests conducted by the BSJ testing laboratory.

Jamaica imports approximately 80 % to 85 % of its energy needs in the form of fossil fuels, primarily heavy fuel oils. According to the Jamaica Public Service Company, the 2020 breakdown of electricity generation by energy supply (fuel) type was: natural gas – 59 %, heavy fuel oil – 27 %, renewable energies – 13 % and light fuel oil (diesel) – 1 %. High energy cost as well as inefficient use of energy thus have the effect of forcing industries, jobs and wealth out of the country. The efficient use of energy and energy diversification are the most immediate solutions to the energy crisis facing Jamaica. An energy efficiency building code is therefore essential to implement these solutions for all building types (hotels, apartment complexes, offices, other commercial properties and residences) across the island since buildings consume as much as 55 % of the total electrical energy generated.

The implementation of the Regional EEBC and the Energy Efficiency Testing and Labelling Programme will be monitored by the municipal authorities and the NCRA respectively.

Outcomes and benefits

Key stakeholders involved in the development of the building codes included:

- Jamaica Institution of Engineers (JIE)
- Jamaica Institution of Architects (JIA)
- Bureau of Standards Jamaica (BSI)
- Ministry of Local Government
- University of the West Indies, Mona
- University of Technology, Jamaica
- Incorporated Masterbuilders Association of Jamaica (IMA)
- Ministry of Science, Energy & Technology (MSET)

Technical representatives from these organizations participated in committees facilitated by BSJ to review the International Code Council's code documents and develop country-specific applications. A new National Building Act was enacted in January 2019 which made the Codes mandatory for the country. The Building Act also empowered BSJ with the authority to determine which version of the Code was applicable in Jamaica. The aim of the Codes under the Act is to provide the framework in which Jamaica can attain its energy goals under the National Energy Policy (2009) to reduce its dependence on fossil fuels and high-energy costs while improving its carbon footprint.

Jamaica is a signatory to the Paris Agreement and submitted its Intended Nationally Determined Contribution (INDC) in November 2015. It subsequently ratified its commitment to the Paris Agreement in 2017, paving the way for the INDC to become the country's first Nationally Determined Contribution (NDC). After identifying opportunities to deepen its emissions reductions in the energy sector, Jamaica updated its NDC in 2020.

The opportunities identified are part of an increasingly comprehensive approach to decarbonize the sector that covers both the electricity generation and energy use sub-sectors. As a result, Jamaica's latest NDC is significantly more ambitious. By 2030, it foresees an emissions reduction for these two sectors of between 25.4 % (unconditional) and 28.5 % (conditional) relative to a business-as-usual scenario (which takes into account policies in place since 2005). This implies that emissions in these sectors would be 1.8 MtCO_{2e} to 2.0 MtCO_{2e} lower than they otherwise would be, compared with a range of 1.1 MtCO_{2e} to 1.5 MtCO_{2e} in its previous NDC.

The implementation of the Energy Efficiency Building Code and Energy Labelling Programme will contribute to Jamaica's attainment of its NDC. It is estimated that a 30 % savings on energy use (electricity) by the residential consumer can be achieved from implementing the REEBC when compared to the traditional construction methods on the island.

Partners involved

Requesting organization:

- Government of Jamaica

Supporting organizations:

- Ministry of Science, Energy and Technology (MSET)
- Ministry of Industry, Investment and Commerce (MIIC)
- CARICOM Regional Organization for Standardization and Quality (CROSQ)
- United Nations Development Programme (UNDP) Jamaica

Timeline

The Jamaica National Energy Policy was developed in 2009. This policy, in conjunction with the country's energy management framework, will support the implementation of Vision 2030 Jamaica – National Development Plan, particularly its National Outcome #10 – Energy Security and Efficiency.

The policy contains seven national energy goals and a strategic action plan to achieve them by 2030. It also aims to increase the percentage of renewables in the energy mix with proposed targets of 12.5 % by 2015 and 20 % by 2030.

Goal 1 of the Policy states that “Jamaicans use energy wisely and aggressively pursue opportunities for conservation and efficiency”. To achieve this goal, Jamaica will:

- Adapt the CARICOM Regional Energy Efficiency Building Code, scheduled to be published by June 2022
- Implement the energy efficiency testing programme for room air conditioners, wine chillers, freezers and refrigerators by January 2022
- Implement an updated National Building Code by March 2022

References

- CRS 57:2018, *Energy labelling – Refrigerating appliances – Requirements*
- CRS 58:2018, *Energy labelling – Compact fluorescent lamps & light emitting diodes lamps – Requirements*
- CRS 59:2019, *Energy labelling – Air conditioners – Requirements*
- Third National Communication (TNC) of Jamaica to the United Nations Framework Convention on Climate Change
- Jamaican Application Document for the International Energy Conservation Code (2019)
- 2018 CARICOM Regional Energy Efficiency Building Code
- Jamaica’s National Energy Policy 2009-2030



BSJ – Jamaica

Building national energy policy in Jamaica

KENYA

Kenya Bureau of Standards (KEBS)

Energy-efficient air conditioners and refrigerators

Overview

Temperatures are rising worldwide, as is the demand for cooling systems. In 2018, the Kenyan government revised its energy efficiency policies for cooling appliances, namely refrigerators and room air conditioners. The new air conditioner policy, in addition to increasing energy efficiency by 11 %, effectively phased out high ozone-depleting R-22 refrigerants in this import market. On the strength of these results, and under the Kigali Cooling Efficiency Program (K-CEP), the Kenya Bureau of Standards (KEBS) revised and implemented minimum energy performance standards (MEPS) and a labelling programme for room air conditioners (RACs) and refrigerators.

Kenya first introduced RAC MEPS in 2013, but the industry immediately called for revision after some challenges were identified during the implementation phase. The revision addressed the following points:

- The scope was broadened to include combined air conditioners and heat pumps, which had previously been excluded.
- Test conditions were changed from T₃ to T₁.
- Energy efficiency levels were reviewed.
- A market surveillance clause was included in the RAC sector.
- The use of refrigerant with low global warming potential was added.

Implementation of the updated RAC MEPS began in April 2019. The revision increased the required efficiency levels for products by 11 % and eliminated 73 % of models on the market in 2018.

Outcomes and benefits

The MEPS are born out of a joint effort by government agencies, regulators, importers, dealers, manufacturers, research institutions, academia, experts, consumer organizations, and KEBS, acting as the committee's secretariat. By October 2019, just six months after the standards were implemented, the Energy and Petroleum Regulatory Authority (EPRA) had registered 63 models into the Kenyan market that met the new requirements. Although the revised norms significantly

increased the efficiency baseline for air conditioners in Kenya, importers responded and were able to easily source higher-efficiency units. The transition went more smoothly than anticipated because energy-efficient products are readily available in the source countries.

While Kenya's MEPS aimed first and foremost to increase the efficiency of room air conditioners, the standards also reduced the import of RACs containing harmful ozone-depleting refrigerants. In 2018, a RAC market assessment found that 27 % of the air conditioner models on the Kenyan market contained the R-22 refrigerant, a hydrochlorofluorocarbon and potent greenhouse gas with high ozone depletion potential. In the Kenyan context, the RAC's low energy efficiency was linked to R-22 refrigerant usage. Today, none of the EPRA-registered RACs contain R-22. The newly registered products all contain R-410A, a hydrofluorocarbon that has zero ozone-depleting potential.

Kenya is well on track to completely phase out the importation, use and sale of ozone-depleting substances by 2026, four years ahead of the 2030 Montreal Protocol deadline. In the RAC sector, the implementation of revised MEPS was also instrumental in accelerating the removal of hydrofluorocarbon ten years before target.

Partners involved

Requesting organization:

- Energy and Petroleum Regulatory Authority (EPRA)

Supporting organizations:

- CLASP, an organization focusing on appliance & equipment energy performance and quality to mitigate and adapt to climate change
- GIZ Proklima, a programme of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), which provides technical support to developing countries to implement the provisions of the Montreal Protocol and the Kigali Amendment

Timeline

The first edition of 2013 took 18 months to complete. More recently, following a 12-month systematic review, the content was split into two separate standards, published in 2019 for air conditioners and 2020 for refrigerators.

NETHERLANDS

Royal Netherlands Standardization Institute (NEN)

Keeping buildings cool in the Netherlands

Overview

The Netherlands plans to build approximately one million new houses over the coming years. It is important, therefore, that they are well adapted to the climatic conditions they will endure during their lifetime to ensure the comfort and well-being of their occupants and limit the production of greenhouse gases. The changing climate means summers are getting warmer and heatwaves are likely to occur more often. The hot spells experienced in the Netherlands these past three years will be no exception in the future. In this context, it is important for homes to remain healthy and comfortable to avoid serious health impacts. As an example, 650 people died in the latest heatwave in August 2021.

The warmer it gets, the more we use air conditioning, which discharges substantial amounts of additional greenhouse gas emissions, as well as excess heat, to the environment. Adequate building design can contribute significantly to buildings that are both comfortable and conducive to residents' well-being, while avoiding the use of environmentally damaging air conditioning systems. Through the [OSKA Platform](#), the Netherlands platform for standards and climate change adaptation, a wide range of companies, governments and knowledge institutions are working together to make the country more resilient to the effects of climate change by incorporating new insights on climate change into standards.

As a first step, OSKA developed a [Declaration of Intent for the Cooling of Buildings](#), which was signed by a wide range of companies, government institutions and knowledge organizations in April 2021. The stakeholders involved in its drafting agreed to start developing a technical guideline whose insights could later be integrated into the country's national standard [NTA 8800](#) on the energy performance of buildings at its first big revision (foreseen for 2025).

The Declaration gives a list of standards to be developed or revised to create a portfolio that offers guidance on the design and construction of buildings which take into consideration the impacts of a changing, hotter climate. One of the standards highlighted is EN-ISO 15927-4, which is currently under revision by [ISO/TC 163/SC 2](#), the ISO subcommittee dealing with calculation methods for thermal performance and energy use in the built environment. It specifies a procedure for

constructing a reference year of hourly climatic information. While it currently refers to historical climatic data, experts are working to provide a systematic approach for describing a future reference year.

The OSKA Declaration was developed with the objective that building design and maintenance practices should take into account the effects of climate change in a structured manner. An important element is the “cooling ladder”, which works on the principle that one should start by creating a cool environment, trying as much as possible to keep the heat out, and only then look at environmentally friendly cooling systems.

Outcomes and benefits

A key element in the OSKA approach is that stakeholders are involved early in the process. Both formal standards (ISO, EN, NEN) and technical guidelines and manuals were taken into consideration, which made it possible to identify standards that needed revising while defining opportunities for new standards development. It offered a pragmatic way of moving forward in the early stages of the project, which garnered support for the approach.

As indicated, first, a technical guideline will be developed which contains the most recent insights on our future climate and the prevalence of heatwaves. It will offer a systematic approach for dealing with the issue of cooling (the so-called “cooling ladder”) with new and innovative technical solutions that respond to the increased demand for air conditioning. Experience gained from using this guideline will then be incorporated in the NEN standard on energy performance of buildings at its first large-scale revision. The current edition is already referred to in the Dutch national legislation for buildings, so that all new constructions must comply with the principles and calculation methods given in the standard.

The “cooling ladder” consists of four steps that must be followed to make buildings adaptive to high temperatures and heatwaves. These include:

1. Creating a cool environment around the building (i.e. with trees and shade)
2. Preventing heat from entering the building (i.e. using solar screens)
3. Discharging heat/passive cooling (i.e. with night ventilation)
4. Using an environmentally friendly way for cooling

See figure on following page (in Dutch).

The OSKA approach will result in buildings that are better equipped to deal with extremes of temperature, ensuring the thermal comfort and well-being of residents. The limited use of air-conditioning units in buildings will lead to lower energy consumption and reduced global emissions. Reliance on air conditioning has the potential to drive significant increases in energy and the OSKA Declaration will go a long way in changing that.

De Ladder van Koeling



Cooling ladder diagram

Partners involved

The [OSKA Platform](#) was initiated and is supported by the Netherlands government. Its secretariat is held by the Royal Netherlands Standardization Institute (NEN).

Timeline

Penned in April 2021, the [OSKA Declaration](#) agreed on the development of a technical guideline that would later be merged with national standard [NTA 8800](#) on the energy performance of buildings at its revision in 2025.

References

- [OSKA](#) (in Dutch)
- [OSKA Declaration of Intent Adaptation to Climate Change](#) (in Dutch)
- [European project “Adaptation to climate change”](#)
- [CEN Climate Change Adaptation](#)
- [ISO/TC 163/SC 2](#)

RWANDA

Rwanda Standards Board (RSB)

Reducing vehicle emissions through standards

Overview

The government of Rwanda is committed to taking urgent actions to mitigate and adapt to the effects of climate change. As a Party to the United Nations Framework Convention on Climate Change (UNFCCC), the country seeks to contribute to the ambitious goal of limiting temperature rise to 2 °C, with efforts to reach 1.5 °C, agreed under the Paris Agreement.

For Rwanda, a country that is deemed highly vulnerable to climate change, adaptation is a key concern and a priority. As is true of most African nations, Rwanda's contribution to climate change in the form of greenhouse gas (GHG) emissions is relatively small, yet emissions from deforestation, agriculture and land use, combined with the emissions growth expected from economic development and energy use, are significant enough to demand a mitigation response.

In order to mitigate climate change challenges, the government of Rwanda has put in place and is implementing various policies, laws, strategies, regulations, standards and conformity assessment tools in the aforementioned contributing sectors. These policies, standards and regulatory tools were also aligned with the ambitious goal of limiting temperature rise to 2 °C, with efforts to reach 1.5 °C, agreed under the Paris Agreement. This case study highlights what is being done in the transportation sector, focusing on the development of standards for vehicle emissions reduction.

It is worth noting that Rwanda's transport sector is dominated by land transport due to the improved national and district road network and increased investment in public transport. With growing demand for travel, the number of vehicles has increased dramatically. Based on registrations, total vehicle numbers are estimated to have grown from 47 631 in 2006 to 161 925 in 2015, representing an increase of over 300 %. Motorcycles accounted for around 51 % of total vehicles in 2015, followed by passenger cars (34 %) and other vehicles including buses and trucks (15 %).

The rise in vehicle emissions prompted the government to put in place policies and regulations aimed at reducing imports of used cars and encouraging the introduction of electric vehicles since 2020 as part of the Rwandan e-mobility programme and mandatory yearly vehicle inspection. Other key transport strategies include using buses as part of public transport, replacing minibuses with modern buses and promoting mass rapid transportation.

Different standards supporting the initiative in the transportation sector have been developed to reduce the emission of pollutants, including NO_x, PM₁₀ and PM_{2.5}, CO and unburnt hydrocarbons. These include RS 407-1:2019, *Emission limits – Specification – Part 1: Road vehicles*, and RS 407-2:2019, *Emission limits – Specification – Part 2: Non-road mobile machinery*. The purpose of developing these standards was to ensure minimum emissions in the transport sector. In addition to these performance evaluations of vehicles and mobile machinery, standards were developed in 2019 on fuels including gasoline (RS EAS 177) and diesel (RS EAS 158) to accelerate the introduction of new cars with advanced engine technologies.

A number of stakeholders were involved in this study, including:

- *Policy makers:* Ministry of Environment (MoE), Ministry of Infrastructure (MININFRA), Ministry of Trade and Industry (MINICOM)
- *Regulators:* Rwanda Utility Regulatory Agency (RURA), Rwanda Environment Management Authority (REMA)
- *Inspectors:* Rwanda National Police (RNP)
- *Policy implementers:* Energy Development Corporation Ltd (EDCL), Rwanda Transport Development Agency (RTDA)
- *Vehicle manufacturers:* Volkswagen Rwanda, SAR Motors
- *Academia:* College of Science and Technology (UR-CST), Integrated Polytechnic Regional College (IPRC) Kigali
- *Garage owners:* TUMECO Garage, Metropole Motors, PurePro® Ltd, Rwanda Garages Association (RGA)
- *Vehicle importers:* Akagera Motors
- *NGOs:* Standards for Sustainability (SfS), Rwanda Environment Management Company (RWEMACO)
- Rwanda Consumer Association
- *Others:* Real Contractors Ltd, Sulfo Industries Rwanda

Outcomes and benefits

How standards address the issue:

The standards provided new stringent requirements compared to existing requirements used by inspectors of vehicles (Rwanda National Police). The majority of imported cars in Rwanda were used vehicles with old technology engines that consume a lot of fuel and emit enormous gases, including GHG. In order to cut down vehicle emissions, Rwanda has now embarked on a journey to phase out the use of vehicles manufactured with old technology and adopt current technologies that are fuel-efficient and less emitting.

Standards for road vehicle emission limits are used by the Rwanda Motor Vehicle Inspection Center to control/measure the emissions and road worthiness of vehicles, either imported new/used or already in use on Rwandan territory. This supports the implementation of the country's air quality policy.

In addition, fuel standards have enabled the implementation of the Rwandan policy strategic plan for phasing out old vehicles and introducing new vehicles with engine technology of at least EURO 4 generation.

Overview of new fuel standards in Rwanda

| Existing requirements | New requirements from RS 407-1:2019 |
|--|--|
| <p>For in-use motor vehicles that are equipped with a spark ignition engine (gasoline), the acceptable ranges for emissions are:</p> <ul style="list-style-type: none"> • CO: 0-15 % Vol. / 0.01 • CO₂: 0-20 % Vol. / 0.01 • HC: 0-9999 ppm / 0.1 • O₂: 0-25 % Vol. / 0.01 | <p>For in-use motor vehicles that are equipped with a spark ignition engine (gasoline), the standards required for a manufactured vehicle are:</p> <ul style="list-style-type: none"> • After 2005: HC: 400 ppm, CO: 1 % • Between 1992 and 2004: HC: 500, CO: 3 % • Before 1992: HC: 600 ppm, CO: 4.5 % |
| <p>For in-use motor vehicles that are equipped with a compression ignition engine (diesel), the acceptable ranges for emissions are:</p> <ul style="list-style-type: none"> • Opacity: 0 to 5^{m-1} effective <p>If opacity is greater than 5^{m-1}, the engine is defective.</p> | <p>For in-use motor vehicles that are equipped with a compression ignition engine (diesel), the standards required for a manufactured vehicle are:</p> <ul style="list-style-type: none"> • After 2005, the following acceptable ranges: opacity: less than 1.5 M⁻¹ • Between 1992 and 2004, the following acceptable ranges: opacity: less than 2.5 M⁻¹ |

Relationship between standards and policy/regulation:

The standards on fuels and vehicle emissions serve as the basis for the conformity assessment of imported fuels and inspection of vehicles, either imported new/used or already in use on Rwandan territory. The implementation of these standards supports policy actions stipulated above and especially the air quality policy.

How standards fit within the framework of existing or new regulation/legislation:

The standards have integrated successfully with the existing legal framework:

- They have helped set the requirements for inspection for all vehicles imported and already in-use on Rwandan territory.
- They have enabled the adoption of new technologies that use fuel efficiently and are less emitting.
- All imported vehicles are currently manufactured with at least EURO 4 technology.

Partners involved

Requesting organization:

- Ministry of Environment via the Rwanda Environment Management Authority (REMA)

Supporting organizations:

- United Nations Environment, Climate and Clean Air Coalition (CCAC)
- Environmental Compliance Institute (ECI)

The above organizations partnered with the Rwanda Standards Board (RSB) in the development of minimum-allowed emissions of on- and off-road vehicles.

Timeline

The initiative for lower transport emissions was launched in May 2018 and included the development of motor vehicle emissions and fuel standards. These were published in 2019 after 16 months in the making.

References

- REMA, [Inventory of Sources of Air Pollution in Rwanda](#), 2018
- Updated Nationally Determined Contribution (May 2020)
- UNFCCC, [Third National Communication Under the United Nations Framework Convention on Climate Change \(U.N.F.C.C.C\)](#), 2018
- National Environment and Climate Change Policy, 2019
- [Green Growth and Climate Resilience Strategy](#), 2011
- Air Quality Law, 2016
- RS 407-1:2019, *Emission limits – Specification – Part 1: Road vehicles*
- RS 407-2:2019, *Emission limits – Specification – Part 2: Non-road mobile machinery*
- RS EAS 158:2019, *Automotive gasoline (premium motor spirit) – Specification*
- RS EAS 177:2019, *Automotive gas oil (automotive diesel) – Specification*
- ISO 14055-1:2017, *Environmental management – Guidelines for establishing good practices for combatting land degradation and desertification – Part 1: Good practices framework*
- ISO 14064 (series), *Greenhouse gases*
- RS ARS/AES 1:2014, *Agriculture – Sustainability and eco-labelling – Requirements*
- ARS/AES 03:2014, *Forestry – Sustainability and eco-labelling – Requirements*



RSB – Rwanda

Reducing vehicle emission in Rwanda through standards

SINGAPORE

Enterprise Singapore (SSC)

Supporting water conservation in Singapore

Overview

Climate change has contributed to the erratic weather our world is facing. There has been a noticeable increase in the frequency of floods and droughts, which is affecting water resources everywhere. It is globally recognized that water is a scarce resource and its scarcity is exacerbated by the impacts of climate change. By 2050, without new policies, global water demand is projected to increase by some 55 %, especially due to growing demand from the manufacturing sector (OECD, 2012).

As one of the most water-stressed countries in the world, managing industrial water demand has been a key priority for Singapore's national water agency, PUB, to support long-term water sustainability. Singapore currently consumes around 430 million gallons of water a day and that figure is expected to nearly double by 2060. The non-domestic sector accounts for more than half of the demand today. Therefore, it is critical that industry users put in place a system to manage their water use more efficiently and play their part in conserving water.

To help manage the situation, PUB, together with Enterprise Singapore (then SPRING Singapore) and industry stakeholders, developed Singapore Standard SS 577:2012 on water efficiency management systems to support the efforts of industry players towards the efficient use of water. The standard complemented PUB's water conservation strategy to better manage the growing demand for non-domestic water.

The Singapore Standardisation Programme provided a public-private partnership platform to engage relevant key stakeholders involved in the standard's development. These included PUB as well various associations and industry leaders from sectors such as building, manufacturing and semiconductors, among others. The standards development platform helped PUB secure the buy-in of key stakeholders through consensus.

In 2019, the International Organization for Standardization (ISO), led by Singapore, developed and published ISO 46001, *Water efficiency management systems – Requirements with guidance for use*, based on SS 577. The standard includes a set of frameworks and guidelines as well as suggested tools and best practices for water users to adopt and improve on their water usage and efficiency. A certifiable standard, ISO 46001/SS 577 supports industry players (including premises consuming

less than 60 000 m³ of water per calendar year) that want to demonstrate their water stewardship beyond applicable regulatory requirements.

Outcomes and benefits

Since January 2015, PUB has included the requirements on water efficiency management practices under Part IV A of the Public Utilities (Water Supply) Regulations. These require big water users with a net water consumption of at least 60 000 m³ of water per calendar year to submit a water efficiency management plan annually. As part of the mandatory water efficiency management practice, about seven hundred large commercial and industrial premises have adopted the water efficiency practices of ISO 46001/SS 577.

The standard enables companies to better manage their water use and achieve water savings, thus reducing operational costs. It also provides international recognition for their water conservation efforts. What's more, users of the standard will contribute directly to United Nations Sustainable Development Goal 6 (Clean Water and Sanitation), which seeks to “ensure availability and sustainable management of water and sanitation for all”. It specifically addresses Target 6.4: “By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.”

PUB will benefit greatly from the reduced water demand as non-domestic water users scale back their extraction rates from the raw water supplies, contributing to the sustainability of the environment. The standard is predicted to achieve industrial water savings of three million gallons per day every year, or savings equivalent to the water demand of more than 25 000 households.

ISO 46001/SS 577 supports the national effort to promote water conservation in organizations. By way of example, Systems on Silicon Manufacturing Company Pte Ltd (SSMC) has implemented several measures for water efficiency, such as using alternative water sources – NEWater now makes up 100 % of its process water usage – and treating exhaust gases with recycled water to achieve an additional 11 % total water recycling rate. SSMC now recycles 70 % of its water, including recycling and reusing water several times before discharging it. Through these water efficiency measures, SSMC saves around 1.15 million cubic metres of water annually, or the equivalent volume from 461 Olympic-sized swimming pools. This translates into sizeable cost savings for the company.

Partners involved

In 2012, Singapore's national water agency (PUB), together with Enterprise Singapore (then SPRING Singapore) and industry stakeholders, developed a national standard to support Singapore's water sustainability journey.

Timeline

Singapore Standard SS 577 on water efficiency management systems was published in 2012 after 17 months in the making. The standard was then elevated to ISO in December 2014 to be given

international status. After four years in development, ISO 46001, *Water efficiency management systems – Requirements with guidance for use*, was published in July 2019.

References

- OECD, "[OECD Environmental Outlook to 2050: The Consequences of Inaction – Key Facts and Figures](#)"
- PUB, "[Singapore Standards on Water Efficiency Management Systems](#)"



SSC - Singapore

Supporting water conservation in Singapore

SPAIN

Asociación Española de Normalización (UNE) Decarbonizing the power sector with renewable gas

Overview

Renewable gas is increasingly gaining attention as a valuable resource for decarbonizing the economy. Yet to manage this energy vector, important regulatory development was needed, not least a reliable way of certifying its “guarantee of origin”. The Spanish Law on Climate Change and Energy Transition stipulates the need to promote renewable gas through the approval of specific plans. These should specify, among other measures, the implementation of a certification system that enables the supervision and control of guarantees of origin, without imposing a specific time frame.

The Spanish Central Administration wasn't aiming to create a system like the one in place for electricity in the near to medium term. For this reason, it was imperative that the gas sector and other groups, especially those linked to the production of renewable gas, develop a certification scheme based on a technical reference document that was agreed upon by all stakeholders involved. Thus UNE 0062:2020, *Guarantees of origin related to renewable gas. Guarantees of origin for biomethane*, was published under the responsibility of UNE, Spain's national standards board.

The initiative for this specification arose from the gas sector itself and was developed by a working group that brought together 15 of the sector's main stakeholders related to biomethane. The objective of the document was to standardize the guarantees of origin (GO) for biomethane at the national level, in line with current legislation and existing voluntary systems, with the aim of creating a standardized, transferable GO that can be used for the trade and dissemination of this renewable natural gas.

Outcomes and benefits

A “guarantee of origin” is an instrument used for verifying the origin of an energy source such as biomethane. UNE 0062:2020 paves the way for implementing the Law on Climate Change and Energy Transition and its requirement that biomethane be promoted through a system that offers suitable guarantees of its origin. The specification establishes the basic requirements of a GO for biomethane from any raw material and process prior to its injection into the gas network. To this end, it defines the relevant terms and definitions, as well as the requirements for registration, issuance, transfer and

cancellation in accordance with current legislation. It also covers measurement methods and auditing procedures. The extended use of biomethane of certified origin should also have a positive impact on the Spanish economy.

Partners involved

Requesting organization:

- Spanish Gas Association (SEDIGAS)

Supporting organization:

- Asociación Española de Normalización (UNE)

Timeline

This specification was one year in the making. It was based on European standard EN 16325:2013, *Guarantees of Origin related to Energy – Guarantees of Origin for Electricity*, and its Amendment A1:2015.

SPAIN

Asociación Española de Normalización (UNE)

Solar-thermal deployment supported by standards

Overview

Commercial concentrating solar-thermal power plants were first developed in the 1980s. Since then, significant technological improvements have been demonstrated, which have made solar plants more efficient in terms of cost and performance. Systematic development of three technologies – troughs, towers and dishes – has led to their ever-increasing ability to concentrate and harness solar energy for electricity production. These advances have enabled large-scale deployment of solar-thermal electric (STE) plants because of their competitiveness, compared to other renewable energy sources, in terms of predictability and reliability of production, power quality, dispatchability, grid stability, and so forth.

Identifying a gap in the standardization aimed at solar-thermal products, the industry recommended developing a series of standards that would define terminology and procedures based on the experience gained during the last decades. Conveniently, in Spain, the industry's main stakeholders were also experts on the national technical committee in charge of solar-thermal standards and could ensure continuous feedback and prioritization where needed.

The first item on the agenda was UNE 206009:2013, *Solar thermal electric plants. Terminology*, which constitutes the terminological base for the solar-thermal industry, to be used in all thermal electric standards. It ensures a common understanding of terms and definitions across the entire sector. Similarly, UNE 206013:2017, *Solar thermal electric plants. Procedure for the generation of solar radiation percentiles years*, which sets out a procedure for elaborating a solar year percentile value (ASP Value) for the design of solar energy projects, is valid for any type of STE plant. The standard helps determine the relevant Direct Normal Irradiance, or DNI, for a particular project and its specific location.

UNE 206010:2015, *Tests for the verification of the performance of solar thermal power plants with parabolic trough collector technology*, is a more specific standard. Of the three STE technologies available, priority was given to the parabolic trough collector, which represents the most consolidated technology for production of clean and renewable energy. The standard provides guidelines for carrying out performance acceptance tests of large parabolic trough solar-thermal

power plants, based on the uncertainty level given in ISO/IEC Guide 98-3 (expression of the uncertainty in measurement). The key features analysed in the standard are availability of solar energy, power consumption, net power generation, non-solar energy supply (backup), and net plant efficiency. Furthermore, it also provides general guidelines for instrumentation, estimation of plant performance parameters and reporting of results. This standard is applicable not only to new STE plants, but also to other plants where these features must be known.

Outcomes and benefits

In Spain, the standardization activities for solar power are advanced. The STE industry is committed to improving technologies that focus on plant efficiency and reducing deployment and operating costs. At the same time, research into new technologies going forward seeks to make solar more competitive and cost-effective for power production. Standards have a key role to play in achieving this goal, and those developed by UNE have already become a reference for improving the quality of current STE plants, as well as ensuring the highest quality of future plants.

The solar power industry relies heavily on standardization to develop normative documents that address both general aspects common to all technologies and specific aspects of each. On the international scene, UNE's work is taken up by the International Electrotechnical Commission (IEC), of which Spain holds the secretariat, to develop International Standards for systems of STE plants and their components. These have also referred to technical aspects standardized by ISO.

The UNE standards will also support the Spanish Integrated Plan for Energy and Climate (PNIEC), which envisions the implementation of 5 GWe of new STE plants over the period 2021-2030. Such large-scale deployment of STE plants should go a long way to reducing CO₂ emissions worldwide.

Partners involved

The standards work was promoted by the Spanish Standardization Committee on Solar Thermal Electric Plants (Comité Técnico de Normalización Nacional para Energía Solar), whose main contributors are:

- CIEMAT (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas), a public research body assigned to the Ministry of Science and Innovation. The Plataforma Solar de Almería (Solar Platform of Almería – PSA), which belongs to CIEMAT, is Europe's largest research, development and test centre on solar concentrating technologies.
- The Centro Nacional de Energías Renovables (National Renewable Energies Centre – CENER), an industrial technology centre dedicated to the research, development and promotion of renewable energy in Spain.
- PROTERMOSOLAR, the Spanish Association for the Promotion of the Solar Thermal Industry, which consists of around 50 members representing the sector's entire value chain: developers, constructors, component manufacturers, engineers, consulting firms, research centres, etc.

Timeline

The UNE standards for solar-thermal energy were developed over a five-year period from 2012 to 2017. Based on previous work, UNE 206009, which lays down the terminology for the industry, took only 18 months to complete and was published in July 2013. That same year saw the start of work on UNE 206010 for parabolic trough collectors, which was released 15 months later in April 2015. Last in the series, UNE 206013 (solar radiation percentiles) was published in May 2017.

SPAIN

Asociación Española de Normalización (UNE)

Taking energy efficiency a step further with standards

Overview

Threatened by climate change, Spain has set to transform its energy systems by focusing on policies that protect both the climate and the environment. Among the initiatives taken to meet these targets, the Spanish national standards body, UNE, has developed two standards on energy procurement and efficient driving management.

Buying energy is a long and convoluted process and the energy services on offer are increasingly complex. To simplify the purchasing process, the market must be more structured, clearer and more reliable, making it easier to compare different service providers. This implies monitoring, identifying and verifying energy saving actions, and these activities must be conducted with diligence and rigour for the end result to be reliable.

Promoted by the sector itself, UNE 216701:2018, *Classification of energy services providers*, contributes to the deployment of energy services in Spain by improving transparency and reliability in their procurement. The standard defines a classification of energy service providers (ESP) that allows for their differentiation and the choice of the most appropriate type for the customer's needs.

Energy services and the selection of an ESP are fundamental to achieving Europe's energy-saving objectives. The European Directive 2012/27/EU establishes a common framework of measures for the promotion of energy efficiency within the EU in order to ensure the achievement of the Union's energy efficiency target. It supports the proper functioning of the energy services market and EU countries are required to set up mechanisms ensuring an ESP is competent to perform its activity. In Spain, the Directive is partially transposed into Royal Decree 56/2016, which also includes other important measures to boost the energy efficiency of the country's industry and services.

Encouraging more fuel-efficient driving is another area recognized as offering significant energy savings. Efficient driving has a significant influence on fuel consumption, which confirms efficient driving as a valid and economical option for reducing consumption and therefore emissions of harmful greenhouse gases into the atmosphere. Besides, it also indirectly improves the security and comfort of the passengers and driver.

EA 0050:2015, *Efficient driving management system for professional fleets*, provides solutions for the monitoring and interconnectivity of information systems focused on improving efficiency and security in road transport. This technical specification describes requirements that must be adopted to define, implement, maintain and improve an efficient driving management system in companies operating a fleet of industrial vehicles. Included under this designation are road transport companies within both the logistics and passenger transport sectors, as well as environmental companies.

EA 0050 gives guidance on the parameters and metrics required for efficient driving and the preferred value ranges for those parameters, classified according to their intended application. It also specifies the requirements for measurement systems and techniques for supporting driving effectiveness, which can be certified in accordance with this specification. Lastly, it gives the fundamentals of a monitoring system that serves as the basis for assessing a driver's competence and the company's management practices.

Outcomes and benefits

The range of activities an energy service provider is able to provide has naturally led to the emergence of ESPs that are specialized in one or more of these services. On the one hand, this specialization makes it possible for an entity to hone its skills in terms of efficiency; on the other, it can constitute a barrier for organizations that are considering hiring an ESP to optimize their energy consumption since the differences between ESPs are not always easy to identify.

The aim of publishing UNE 216701 was to clear away such uncertainties by establishing a typology of ESPs based on the types of activities they carry out. In addition, the standard includes minimum requirements for technical capacity and experience that guarantee a certain level of quality and work from the ESP which, so far, in the absence of a consensus document, could only be assumed.

Similarly, EA 0050 was developed to provide a uniform method for promoting more efficient driving techniques, which have received much attention in recent years for their environmental benefits. The technical specification has been helping companies with industrial vehicle fleets put in place systems to monitor and analyse driving behaviour, train up staff, especially drivers, better manage fuel and set up incentive programmes, among many other things. Published in 2015, the specification hasn't made its way into legislation yet, but it contributes to several environmental policies, both at national and European level.

Partners involved

UNE 216701

Born out of the sector itself, UNE 216701:2018 was developed with the consensus of AMI (Association of Comprehensive Maintenance and Energy Services Companies), ADHAC (Association of Heat and Cold Networks Companies), ATECYR (Spanish Technical Association of Air Conditioning and Refrigeration) and A3E (Association of Energy Efficiency Companies), together with the Association of Spanish Agencies for Energy Management (EnerAgen).

EA 0050

In 2014, ADN Mobile Solutions, a technology company working to improve efficiency and security in road transport, identified the need for a document that would provide standardized requirements for an efficient driving management system. The idea garnered support from other transport-related organizations, such as the Spanish Association of Automobile and Truck Manufacturers (ANFAC) and the MAPFRE Road Safety and Experimentation Center. This sector collaboration led to the development of EA 0050:2015.

Timeline

EA 0050 for efficient driving management was published in June 2015 after 12 months in the making. That same year, work began on UNE 216701 for energy service providers, which led to a first classification as technical specification EA 0055. This was later replaced by a fully-fledged standard in 2018.

SWEDEN

Swedish Institute for Standards (SIS)

Public-private initiative for industrial climate transformation

Overview

It is Sweden's goal to become one of the world's first fossil-fuel-free countries and many Swedish industries are working to reduce their climate impact. The Paris Agreement of 2015 opened up a new chapter in political efforts to tackle climate change while, at the same time, recognizing the importance of non-state actors in taking climate action. As a result, the Swedish government is currently running a programme designed to increase cooperation between the public and private sectors to address societal challenges that the country might face in the future.

Meeting the country's carbon-neutrality target will not only depend on incentives provided by the government, but also on voluntary climate action taken by industries and business. A joint public-private task force has been working to provide definitions and measurements that are relevant for climate change policy and mitigation, an essential step towards industrial climate transformation.

In the context of climate change, standards form a necessary basis for regulation and policy. It is very difficult to make good policy without consistent definitions and effective ways of measuring things. Thus, it is of interest to all stakeholders and standards makers to have access to suitable standards for measurement and terminology.

The Swedish Institute for Standards (SIS) took part in this programme to address issues surrounding the development of standards for digitalization. Within the scope of the programme, SIS participated in several subgroups, including a subgroup on measurement and definitions for climate change policy and mitigation.

Outcomes and benefits

SIS' involvement in the programme enabled it to present existing standards work that is relevant to the field. The aim was also to encourage discussion and debate among key stakeholders on future standardization needs for tackling climate change. This is imperative in order to develop well-crafted policies and better assess their effectiveness.

Capitalizing on the initiative's success, possible next steps might include the mapping of relevant projects and standards that are already underway, to help identify where new standards or the revision of existing ones are needed.

Partners involved

Requesting organizations:

- Ministry of Environment
- Ministry of Enterprise and Innovation
- Swedish Environmental Protection Agency

Supporting organization:

- Swedish Institute for Standards (SIS)

Timeline

This ongoing project seeks to establish a long-term dialogue between public and private stakeholders to identify standardization needs for terminology and measurement that might be useful in Sweden's climate change policy.



SIS – Sweden

Public-private initiative for industrial climate transformation

UNITED KINGDOM

British Standards Institution (BSI)

Standards supporting UK ambitions to net zero

Overview

To accelerate the growth of energy smart appliances (ESAs) in the UK and enable the roll-out of electric vehicle (EV) charge points, the UK government supported a stakeholder-led process to create the necessary knowledge infrastructure. The initiative included a major standards development work stream led by the British Standards Institution (BSI) in its role as the UK's national standards body, and is a critical enabler for the UK government's stated ambition of decarbonizing the operation and use of the UK's transport system and achieving cross-economy net-zero impact by 2050.

It was important to ensure broad stakeholder inclusion and the forum had a government cross-department team: the Office for Zero Emission Vehicles (OZEV), the Department for Business, Energy and Industrial Strategy (BEIS) and the Department for Transport (DfT); the regulator (Ofgem) and representatives of the UK's innovation community (Energy Systems Catapult); industry and trade associations (distribution network operators, Energy Networks Association, BEAMA, Society of Motor Manufacturers and Traders, Confederation of British Industry, techUK); the joint government–industry Electric Vehicle Energy Taskforce (EVET); certification and accreditation bodies (United Kingdom Accreditation Service, Association of British Certification Bodies); academia, research and consumer interest groups such as the UK Energy Research Centre (UKERC) and Citizens Advice.

From the forum, BSI formed a Strategic Advisory Group (SAG) to guide and coordinate a multi-stakeholder, collaborative approach to the development of new standards that would be aligned with existing and planned regulation. The agreed programme outcomes were based on national policy principles of grid stability, data security and privacy, interoperability, and consumer focus.

The approach built on previous research and engagement work commissioned by BEIS around standards, policy and regulation in this area, which included mapping the existing framework of standards and regulation and identifying knowledge gaps and needs. In May 2021, two new consensus-based, fast-track, iterative publicly available specifications (PAS) were published: PAS 1878, *Energy smart appliances – System functionality and architecture*, and PAS 1879 *Energy smart appliances – Demand side response operation – Code of practice*.

Outcomes and benefits

The stakeholder work and standardization programme will help to inform planned government regulations and guidance on ESAs and smart EV charge points, as well as provide the basis for a future certification market and accreditation framework. After an initial period of gathering implementation feedback, it is envisaged that we will put the documents forward for consideration to the international standards community in ISO and the International Electrotechnical Commission (IEC) for use as global standards for industry.

Partners involved

Requesting organization:

- UK government

Supporting organizations:

- British Standards Institution (BSI)

Timeline

The initiative ran from early 2019 to May 2021.

References

- BSI, “Energy Smart Appliances Programme” [Web page]: www.bsigroup.com/en-GB/about-bsi/uk-national-standards-body/about-standards/Innovation/energy-smart-appliances-programme/
- PAS 1878, *Energy smart appliances – System functionality and architecture*: www.bsigroup.com/en-GB/about-bsi/uk-national-standards-body/about-standards/Innovation/energy-smart-appliances-programme/pas-1878/
- PAS 1879, *Energy smart appliances – Demand side response operation – Code of practice*: www.bsigroup.com/en-GB/about-bsi/uk-national-standards-body/about-standards/Innovation/energy-smart-appliances-programme/pas-1879/

UNITED KINGDOM

British Standards Institution (BSI)

Faraday Battery Challenge Standards Programme

Overview

There is a growing demand for batteries for electrification, with the market across Europe alone estimated to be worth GBP 50 billion by 2025. The Faraday Battery Challenge, backed by the UK government, is investing in research and innovation projects and new facilities to scale up and advance the production, use and recycling of batteries. Standards and best practice have a key role to play in supporting the growth of the industry.

The British Standards Institution (BSI) has been leading the standards programme, sponsored by Innovate UK and the Faraday Battery Challenge (FBC), to capture and respond to the challenges and standardization gaps within the battery manufacturing industry. In addition to the initial three standards and the publication of a long-term *Battery manufacturing and technology standards roadmap*, engagement and outreach (via learning materials, video events, etc.) were seen as essential elements for raising awareness and market confidence.

A five-part approach has underpinned the programme and helped achieve its objectives and deliver market benefits:

1. It was essential to convene a neutral forum to support the delivery of the Faraday Battery Challenge (FBC). Innovate UK drew together stakeholders from the UK's knowledge infrastructure community (Health and Safety Executive, National Physical Laboratory, BSI, FBC bodies and regulators) to create a battery manufacturing customer journey map (CJM). BSI then convened stakeholders and industry experts to prioritize and address the immediate codification needs identified in the CJM, involving the UK's innovation community, government, regulators, representatives of the automotive industry and trade associations, technology developers, academia and research.
2. Agreement was needed on the objectives, the purpose and the desired outcomes of the programme. The agreed purpose was to ensure that the research and innovation conditions required to deliver the UK's net-zero target are in place, enabling the deployment of battery technology to decarbonize the UK's transport sector and build consumer confidence in electric

vehicles (EVs). Successful outcomes of the programme would be to develop initial best practice and guidance to enable EV battery manufacturing and the safe deployment of EVs at scale in the UK, draw up a standardization roadmap in support of the FBC's next phases, and capture the wider battery manufacturing and technology development ambitions of the UK FBC community.

3. It was vital to map the existing market framework of standards and regulation. This helped give an idea of all the standards and regulatory research built on the CJM, which identified initial standards gaps and priorities for immediate development.
4. Alongside the mapping described in item 3 above, agreement on ethical principles, standards and rules, and how they will work together, was needed. This was reflected in the multi-stakeholder, collaborative approach captured in the programme's governance and delivery structures, via the establishment of a technical advisory group, creation of steering groups and review panels for publicly available specifications (PAS), and building in engagement and dissemination work. Wide, ongoing stakeholder engagement and industry contributions were strongly prioritized.
5. Standards development and coordination started around identified immediate codification gaps, deploying a consensus-based, fast-track, iterative standards solutions mechanism (three PAS documents were developed and published). Long-term standardization needs were also identified, alongside dissemination and uptake actions, including opportunities for internationalization of UK-led best practice – these are captured in the *Battery manufacturing and technology standards roadmap* (developed and validated with the wide FBC stakeholder community). Videos have been developed and published on BSI's YouTube channel, and the standardization programme was represented at relevant conferences and events, including those organized by BSI, Innovate UK and related organizations and CENEX (Low Carbon and Fuel Cells Centre of Excellence).

Outcomes and benefits

The FBC Standards Programme has advanced good practice (in the UK) for battery manufacture through:

1. The development of the PAS 706X series focusing on health, safety and environmental considerations
2. A multi-stakeholder, agile standards development process in a rapidly evolving area of innovation, and continued amplification and dissemination activity to widen the reach of the programme
3. The *Battery manufacturing and technology standards roadmap* developed throughout the programme to set out further challenges, knowledge gaps and a plan for addressing them
4. A network of over a hundred organizations with whom BSI has engaged throughout the programme with a focus on technical roles and engineers

Partners involved

Sponsored by Innovate UK through the Faraday Battery Challenge, BSI launched a standards programme in 2019 to develop and codify good practice and build public confidence in batteries and electric vehicles.

Timeline

By August 2021, BSI had published three PASs under the programme, which started in 2019.

References

- Faraday Battery Challenge – Standards, guidelines, research and viewpoints ([general information](#))
- Faraday Battery Challenge [videos](#)
- Faraday Battery Challenge, Download Standards Landscape [Report](#)
- Faraday Battery Challenge: standards programme ([summary](#)) [PDF]
- *Battery manufacturing and technology standards roadmap* ([report](#))
- [PAS 7060:2021](#), *Electric vehicles – Safe and environmentally conscious design and use of batteries – Guide*
- [PAS 7061:2021](#), *Batteries for vehicle propulsion electrification – Safe and environmentally conscious handling of battery packs and modules – Code of practice*
- [PAS 7062:2021](#), *Electric vehicle battery cells – Health and safety, environmental and quality management considerations in cell manufacturing and finished cell – Code of practice*
- Reference to PAS 7061:2021 in *Securing Technology-Critical Metals for Britain* ([report](#)), Birmingham University, April 2021, p. 125

ZIMBABWE

Standards Association of Zimbabwe (SAZ)

Promoting energy and water management in industry

Overview

With financial support from the Climate Change Technology Centre & Network (CTCN), the government of Zimbabwe and the Business Council for Sustainable Development of Zimbabwe (BCSDZ) implemented a project to address climate change through efficient energy and water utilization. The Standards Association of Zimbabwe (SAZ) played a very essential part in the project by encouraging the adoption of a systems approach to energy efficiency in companies and promoting energy auditing techniques. Importantly, it also helped mainstream climate change mitigation through the use of ISO 50001, *Energy management systems – Requirements with guidance for use*, to improve operational efficiency, save energy and cut costs.

As a key stakeholder, SAZ had two of its officials participate in an energy and water efficiency training course attended by 40 participants from Zimbabwe. In addition to SAZ, national counterparts included the Ministry of Environment, Water and Climate; the Ministry of Energy and Power Development; the Ministry of Industry and Commerce; and the Zimbabwe Energy Regulatory Authority.

Ten large organizations from the fields of fertilizer manufacturing, cable manufacturing, agro-processing, cement processing, mining, and food and beverages were given training on ISO 50001, energy efficiency, water efficiency and how these could help with climate mitigation and adaptation. After the training, each organization underwent an audit to determine its energy and water efficiency.

Outcomes and benefits

The training and audits had the following benefits with respect to energy and water efficiency and climate change mitigation:

- Reduction in emissions of up to 22 760 tCO₂e
- Training of 40 industry experts in energy and water efficiency and the use of ISO 50001
- Adoption of climate mitigation measures (improved boiler efficiency, energy-efficient lighting, adoption of renewable energy technologies in some of the case studies)

- Adoption of a 1 MW solar plant by one of the participating companies of the technical assistance project
- Implementation of 161 climate mitigation and adaptation recommendations for energy and water efficiency across ten companies
- Potential savings of about USD 3.85 million due to climate mitigation and adaptation actions
- Development of the *Energy and Water Management Manual for Industrial Sector in Zimbabwe* for use by the country's manufacturing industries and the mining sector
- Power factor correction in the selected ten case studies

Partners involved

Requesting organizations:

- Business Council for Sustainable Development of Zimbabwe (BCSDZ)
- Government of Zimbabwe

Supporting organizations:

- Standards Association of Zimbabwe (SAZ)
- Ministry of Environment, Water and Climate
- Ministry of Energy and Power Development
- Ministry of Industry and Commerce
- Zimbabwe Energy Regulatory Authority (ZERA)
- Scientific and Industrial Research and Development Centre (SIRDC)

Timeline

The project ran throughout 2018.

References

- [*Energy and Water Management Manual for Industrial Sector in Zimbabwe*](#)

THE LONDON DECLARATION

The London Declaration, signed in September 2021, defines ISO's commitment in supporting the climate agenda.

Our climate commitment

International Standards play a crucial role in underpinning the global economy, creating trust on all aspects of international trade. ISO has a number of standards that are essential in supporting the climate agenda; they help adapt to climate change, quantify greenhouse gas emissions and promote the dissemination of good practices in environmental management. The science is clear: the need for urgent measures to reduce emissions and help adapt to climate change is overwhelming.

Without up-to-date International Standards, industry and other stakeholders will be unable to achieve what is necessary. ISO hereby commits to work with its members, stakeholders and partners to ensure that International Standards and publications accelerate the successful achievement of the **Paris Agreement**, the **United Nations Sustainable Development Goals** and the **United Nations Call for Action on Adaptation and Resilience**.

ISO will:

- Foster the active consideration of climate science and associated transitions in the development of all new and revised International Standards and publications
- Facilitate the involvement of civil society and those most vulnerable to climate change in the development of International Standards and publications
- Develop and publish an Action Plan and Measurement Framework detailing concrete actions and initiatives and a reporting mechanism to track progress



ISO Secretary-General **Sergio Mujica**, ISO President **Eddy Njoroge**,
Dr Scott Steedman, Director-General, Standards at BSI.

The IEC and ISO Climate Action Kit is a collection of case studies from around the world on how standards can be effectively used as a tool for sustainability.

About IEC

The IEC (International Electrotechnical Commission) brings together 172* countries and close to 20 000* experts who cooperate on the global IEC platform to ensure that products work everywhere safely with each other. The IEC is the world's leading organization that prepares and publishes globally relevant International Standards for the whole energy chain, including all electrical, electronic and related technologies, devices and systems. The IEC also supports all forms of conformity assessment and administers four Conformity Assessment Systems that certify that components, equipment and systems used in homes, offices, healthcare facilities, public spaces, transportation, manufacturing, explosive environments and energy generation conform to them.

For more information, please visit www.iec.ch

About ISO

ISO (International Organization for Standardization) is an independent, non-governmental international organization with a membership of 165* national standards bodies. Through its members, it brings together experts to share knowledge and develop voluntary, consensus-based, market-relevant International Standards that support innovation and provide solutions to global challenges.

ISO has published more than 23 500* International Standards and related documents covering almost every industry, from technology to food safety, to agriculture and healthcare.

For more information, please visit www.iso.org

*September 2021

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