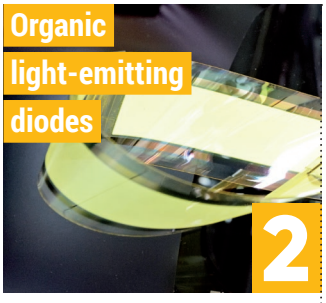
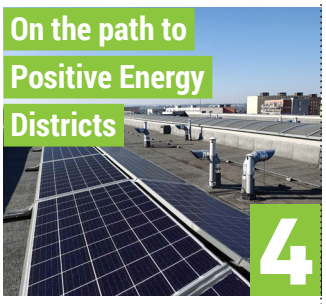
DECEMBER 2021 / JANUARY 2022

Energy efficiency NEWS at SEVEn from the Czech Republic and EU



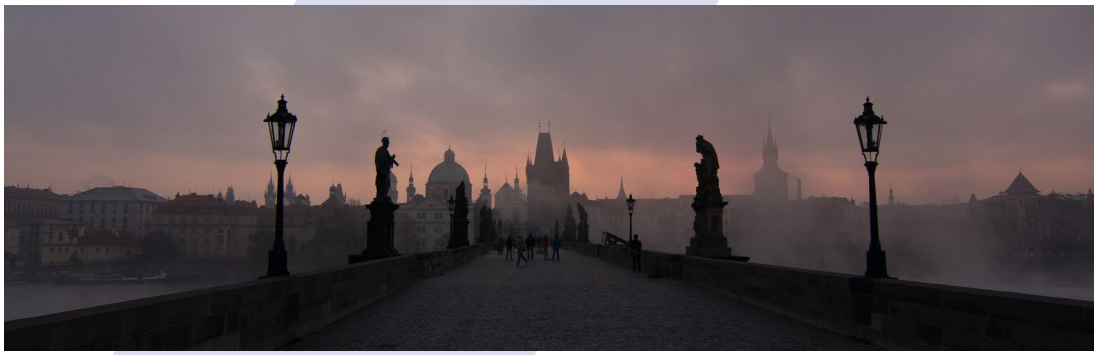


FROM THE CONTENT:

Big data attack buildings

Modern buildings churning out terabytes of data are becoming very valuable, and not just to building managers. The aim of using such data is and will be to increase the energy efficiency of buildings, improve management, calculate more accurately the payback of energy saving measures and, all in all, reduce operating and investment costs. Finally, the goal is also to manage potential energy production and consumption.

The concept of "big data" is determined by several characteristics that are also key in the MATRYCS project. This involves *large amounts of data* (volume), typically gigabytes to tens of terabytes per year. Furthermore, there is a *high variety of data*: from simple sensors to structured data from different systems. Another pillar of big data is the *speed of data generation* (velocity), which for some data is close to real time, while for others it is intervals of hours or days. Finally, the *accuracy* (veracity) of the data is also given, referring to the different quality of the input values. *Scalability* and overall *scope* are also important →3



Prague presents its climate plan to the world

Representatives of the City of Prague, Mayor Zdeněk Hřib and Deputy Mayor for the Environment Petr Hlubuček, presented a key document at the COP 26 global climate change conference in Glasgow, which sets out the city's ambitious climate protection and greenhouse gas reduction targets. Prague has thus joined dozens of global metropolises and thousands of other cities that have signed the global Covenant of Mayors and committed to an active path to carbon neutrality.

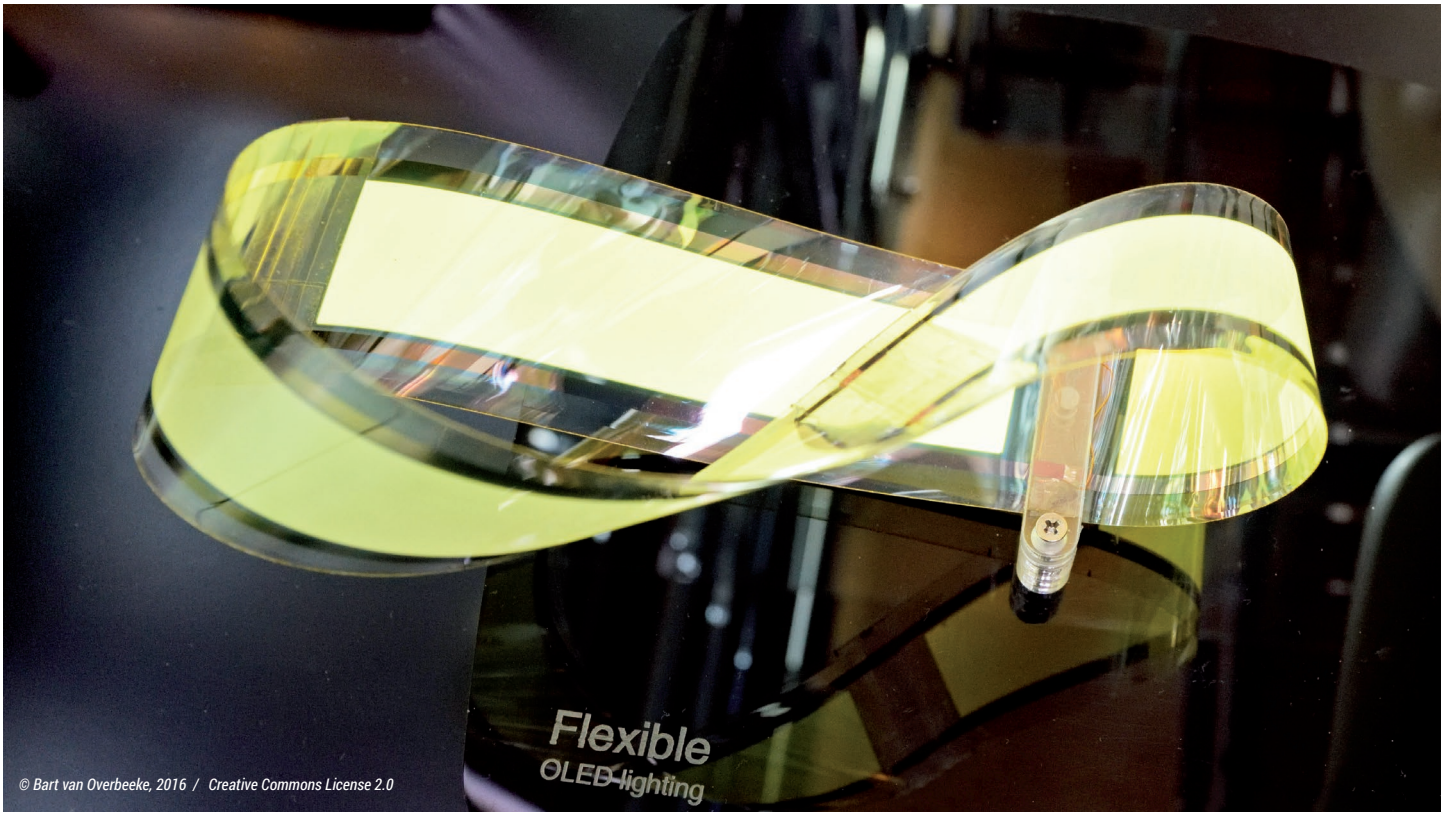
Prague's 2030 Climate Plan, also known as SECAP (Sustainable Energy and Climate Action Plan), envisages a 45% reduction in carbon dioxide emissions over the next ten years compared to 2010. This target will be achieved by implementing 69 specific measures in four areas.

The *sustainable energy sector* will consist in the massive deployment of photovoltaic panels and cogeneration sources, which together should achieve a 15% reduction in heat and gas consumption or up to 60% reduction in CO_2 emissions from electricity and heat supply. A special organisation, the Prague Renewable Energy Community, will be created for this purpose, which will serve as a platform for installing renewable energy sources, sharing the energy produced and coordinating investment projects. The consumption side of the plan includes the deployment of energy management and a number of energy saving projects.

Other areas include *sustainable mobility*, aimed at building the infrastructure for electromobility and the public transport network, and the *circular economy* with the aim of intensifying the use of secondary raw materials in the city, for example by recycling gastro waste into biomethane or increasing the amount of sorted waste to 65%. The plan also includes adaptation measures linked to the city's adaptation strategy, such as building green and blue infrastructure or the annual assessment using the city's climate label.

Václav Šebek vaclav.sebek@svn.cz
Tomáš Vořišek tomas.vorisek@svn.cz

ISSN 1213–5844 MK ČR E 13241



Organic light-emitting diodes

Organic light-emitting diodes (OLEDs) are a relatively promising and still developing type of light source alongside inorganic light-emitting diodes (LEDs). However, figuratively speaking, OLEDs still suffer from many childhood diseases. What is the principle and use of OLEDs?

The OLED principle

An OLED is a surface with a very thin layer of carbon semiconductor where electroluminescence occurs when current passes through it, similar to that of an LED. OLEDs emit light diffusely over the entire surface, so it is a so-called surface-area light source. The amount of light can be controlled by the current passing through and the spectrum emitted corresponds to the material properties of the electrode. White light is achieved in various ways, the most common being a combination of layers emitting in the red, green and blue regions of the spectrum. Current OLED sources can have more than 40 layers. By appropriately combining different layers, the overall efficiency can be increased as well as adjusting the overall colour temperature. OLEDs can nevertheless also work like most LED light sources, emitting blue light with a phosphor layer converting the light into other colours.

OLED production is facing several technological challenges. First, precise deposition of individual layers with very low thickness variation is required, which is crucial for the resulting quality of the radiation. The requirement for low photon absorption in the layer materials and maximum cathode reflection to increase efficiency poses another technological challenge. Other problems include the thermal stability of the materials.

The use of OLED

Due to the technological problems mentioned above, OLED is still not a widespread light source. However, OLED research and development is proceeding rapidly and a gradual reduction in price and uptake in general lighting can be expected. This is thanks to OLED's very favourable properties. First, it is a flat light source, which eliminates glare problems or the need to direct or adjust the light in any way. Therefore, the use of OLEDs promises a very pleasant and simple area lighting of interior spaces. In addition, OLEDs are very narrow and can be flexible. This feature has already led to numerous design luminaires. OLEDs are also used in the automotive industry, especially in some cars for rear red lights. Today's most common use of OLEDs is mainly in TVs, where the development is ahead of general lighting.

The development of OLEDs is still continuing vigorously. OLEDs' biggest competitor are conventional inorganic LEDs, whose efficiencies are already almost double today. Nevertheless, we can expect a gradual reduction in price and applications in the form of luminaires where OLEDs excel: area lighting and design luminaires.

TODAY'S LABORATORY MAXIMUM OF ORGANIC LIGHT-EMITTING DIODES

Efficacy	139 lm/W
Luminance	1000 cd/m^2
CCT	2,857 K
Colour rendering	R_a = 81

Michal Staša *michal.stasa@svn.cz*

Reducing risk in energy efficiency projects

The European economy is undergoing a transformation, accelerated by the recovery from the COVID-19 crisis and soaring energy prices. The European Commission's ambitious climate goals and national recovery plans offer a unique opportunity to kickstart a new, modern and above all sustainable economy. The EU's European Green Deal[1] will provide, with the help of the European Investment Bank, the Member States with funding to support the implementation of the objectives of their national recovery plans. Financing energy-saving projects is therefore one of the areas that deserves particular attention.

DATABASE on Energy Efficiency Financing

[1] *The EU's European Green Deal*

[2] *Triple-A project*

[3] *The interactive web database*

[4] *ELENA programme supporting EPC projects*

Providing funds for energy efficiency projects and determining the risk level of investments can be quite challenging for financial institutions and private investors without prior experience. Reducing the risk of investing in energy efficiency projects is the objective of the international Triple-A project[2], which has developed standardised tools for a consistent approach to project risk assessment.

An extensive interactive web database[3] has been created, consisting of a visual presentation of the most important aspects of financing energy efficiency projects, including risk mitigation strategies, investor preferences for financing energy efficiency projects, key performance indicators, financial models and the design of the most appropriate instruments to use for project financing. The database provides case studies from eight European countries with a focus on SDGs. Apart from the Czech Republic, the project also involves Germany, the Netherlands, Greece, Italy, Spain, Lithuania and Bulgaria.

During May and June 2021, webinars were held across Europe to present standardised instruments and modern financial models for financing energy efficiency projects to target groups. In addition, during the Czech webinar a representative of the National Development Bank (formerly the Czech-Moravian Guarantee and Development Bank) presented the new ELENA programme[4] to support Energy Performance Contracting (EPC) projects. The webinar will be followed by a series of workshops that will enable a closer introduction to the tools and methods developed within the Triple-A project. Invitations to the workshops can be found on the SEVEn website and social media.

Jan Veleba jan.veleba@svn.cz

Big data attack buildings

CONTINUED FROM PAGE 1

attributes of the MATRYCS project. From the outset, the project focuses not only on buildings, but also on overarching datasets, quarters and entire cities.

The MATRYCS project is inherently interdisciplinary. Modern IT technologies are an important component, and a detailed knowledge of buildings, both in terms of construction and energy flow and use, is also required for the meaningful use of data.

The IT part of the project integrates a number of existing solutions. These are usually open-source technologies that have been selected for their suitable characteristics (speed, scalability, high support, broad user base and other specific requirements). The core of the IT part of the MATRYCS project is a common data model within which the individual modules can communicate with each other and use the same range of information. The main technologies used include, for example, the sophisticated non-relational Scylla database and the use of the Apache Kafka event streaming platform. Adequate data cleaning, input data enrichment and overall unification are required to exploit the common data model. The "smart" part and the main brain of the project is data processing with machine learning. Ultimately, the IT part of the project includes adequate data reporting.

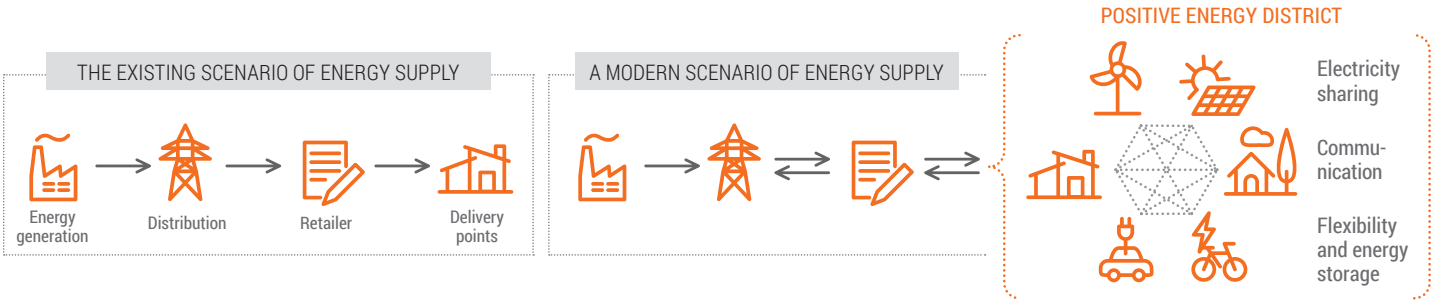
The data (IT) part of the project is used by 13 different services, which are building-specific applications and savings calculations. These applications include, e.g. prediction of consumption from input data, real-time monitoring of building automation, optimisation of HVAC networks, fault detection and thus increased operational stability, predictive and preventive maintenance of buildings, calculations of optimal energy saving measures, work on the Digital Building Twin, etc. The MATRYCS project includes 11 large scale pilots in which these services will be used and tested in practice.

MATRYCS is unique in its scope and scale, bringing together the technological challenges related to big data, data processing, machine learning, data interpretation and expertise in building, HVAC and energy savings.

Michal Staša michal.stasa@svn.cz

On the path to Positive Energy Districts

Positive Energy Districts (PEDs) are self-contained parts of cities or groups of interconnected buildings aimed at energy efficiency and generating an energy surplus, especially with the help of renewable energy sources, with the goal of significantly reducing the production of greenhouse gas emissions with a view to a path towards climate neutrality. Thus, PEDs create local energy communities with overlaps into the global social and energy system. PEDs require the integration of various systems and infrastructures and the interaction among buildings, users and regional energy, mobility and information systems, while ensuring energy supply and quality of life for all in line with social, economic and environmental sustainability.



ENERGY SUPPLY SCENARIOS AND THE PED PRINCIPLE

The involvement of all stakeholders is by far the most important element for the successful implementation of PEDs. In the early stages of PED development, it is essential to reach out not only to representatives of municipalities, but also to other important parties such as investors, developers, energy companies and citizens themselves.

However, these stakeholders often lack detailed information, especially on long-term impacts. The project will therefore focus on creating a basic information and decision-making framework on the options and impacts of PED implementation.

An innovative PED assessment methodology will be developed under the project for use and implementation by individual stakeholders so that these stakeholders and decision makers have the best possible information at an early stage on how to achieve Positive Energy Districts. The method will be adapted to spatial development strategies, concepts and processes of each European country and will take into account the experience and know-how of other countries.

The method will be verified in real conditions using the so-called living labs (pilot projects with a user-oriented approach). There are three real projects within the PED-ID project that is being represented by the Czech Republic in the town of Rožnov pod Radhoštěm.

More information about the project

Jakub Kvasnica *jakub.kvasnica@svn.cz*

The Central Wastewater Treatment Plant on Císařský Island in Prague

Biomethane in the Prague distribution system

The biogas plant that is under construction in Prague's Troja district will supply biomethane to the distribution network in the coming years. Biomethane contains less energy than natural gas and needs to be enriched with propane before being injected into the grid. A new computational model will help determine how biomethane will be distributed in the network. In the future, this will enable us to significantly reduce and possibly eliminate costly enrichment, so-called propanisation or carburation, which has a significant carbon footprint.

Biogas will be produced by the Central Wastewater Treatment Plant on Císařský Island from sludge, the residual product of water treatment. The plant is expected to start test operation in the next few years and then move to standard operation. The biomethane can be injected directly into the city's gas network to cover part of the consumption with fuel produced from a renewable source. Due to the absence of certain hydrocarbons compared to natural gas, it must be enriched with propane to maintain constant gas quality in the network. However, propane blending, also known as propanisation or carburation, imposes additional economic and environmental costs. Propane is obtained from fossil sources and must be delivered to the biogas plant by truck in pressurised tanks.

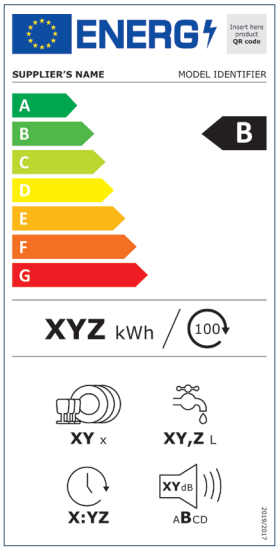
To be able to inject biomethane into the network without modification, it is necessary to find out how it is distributed in the network and how it affects the natural gas parameters. This is precisely what the software that is being developed will be used for together with follow-up procedures necessary to evaluate the gas quality parameters at specific points within the distribution system.

The first step in the software development is to create dynamic hydraulic models of the distribution network simulating the extreme "summer day" and "winter day", i.e. the days with the lowest and highest consumption. The summer period is crucial. Gas consumption is low and biomethane can spread over a large distance in the network, affecting gas quality parameters in a larger part of the distribution network in a given area. Simulations will help to identify the most affected area and help the distributor to adjust the configuration of the network operation. Measurements will be made in the identified area next year, after the plant is commissioned, to verify the model outputs. According to the ongoing simulations, biomethane will mostly affect the Dejvice and Bubeneč districts with their relatively complicated pipeline networks. The computational model that can be finetuned in this "challenging terrain" will be easily applicable to other biogas plants. Therefore, the ambition of the research project is that biomethane can continue to be used without further modifications in all installations in the Czech Republic.

Activities in the field of modelling of biomethane diffusion in the distribution network are carried out by a consortium of SEVEn, Pražská plynárenská Distribuce, SIMONE Research Group and the Czech Gas Association within the ***Smartinject*** project co-funded by the Théta programme of the Technology Agency of the Czech Republic (TA CR).

Václav Šebek *vaclav.sebek@svn.cz*

New energy labels for electrical appliances – main changes



As of March 2021, selected categories of electrical appliances are marked with new energy labels. The goal was to make the classification of appliances into energy classes clearer for consumers, encouraging them to choose energy efficient models. What are the main changes and first impressions?

The products affected by the introduction of the new energy label are appliances used mainly in households. Since 1 March 2021, these appliances carry the new label:

- refrigerators and freezers;
- washing machines and washer-dryer combos;
- dishwashers;
- televisions, monitors and electronic displays.

From 1 September 2021 the new labels also appear on light sources. Energy labelling applies to some professional refrigeration products as well. These include refrigerating appliances with a direct sales function, beverage coolers and ice cream freezers. If sold, they are also subject to the same energy labelling requirements.

For other product groups, such as tumble dryers, ovens, boilers and air conditioners, the current label will not change and the switch to the new label will take place in the coming years.

Main changes

- For all new products the energy label rating system uses A to G rankings. Class extensions with symbols like A+ will no longer be used. In addition, with the introduction of new energy labels, class A is left "empty" in most cases to encourage manufacturers to further technological innovation in the field of energy efficiency.
- The label is linked via a QR code to the new EU product database (EPREL). The database offers all consumers additional information on labelled products, such as the energy label and the product information sheet, along with a wide range of additional information on the product's operating characteristics.
- The energy consumption of products is displayed in a more prominent, uniform way. Except for refrigerators, annual energy consumption is no longer displayed, but the consumption per 100

→7

Information manuals on the new energy labelling

New legislation on energy labelling came into force in 2021, regulating certain aspects of the display of energy labels at points of sale. User-friendly manuals are available for sellers and suppliers of these products. A separate manual has also been compiled for manufacturers, importers and sellers of light sources.

All these publications have been prepared in cooperation with the Ministry of Industry and Trade, the State Energy Inspectorate, the Association of European Home Appliance Manufacturers and the Consumer Electronics Association.

Juraj Krivošík
juraj.krivosik@svn.cz

ENERGY LABELLING FOR INTERNET SALES

An informative guide on the display of energy labels and information sheets when selling online.

Download (in Czech)

ENERGY LABELLING OF PRODUCTS IN BRICK-AND-MORTAR STORES

A clear manual with illustrative examples of correct and incorrect display of energy labels in brick-and-mortar stores.

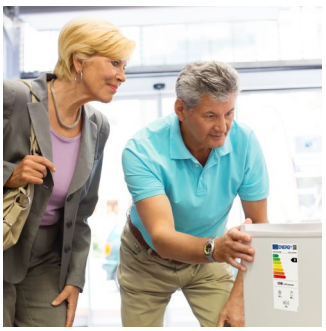
Download (in Czech)

PRODUCTION AND/OR IMPORT OF LIGHT SOURCES AND LUMINAIRES

A manual on the development and issuance of energy labels for various types of light sources.

Download (in Czech)

CONTINUED FROM PAGE 6



More information about the project LABEL2020

washing or dishwashing cycles or 1,000 hours of TV operation is displayed.

→ The lower part of the label contains various pictograms that provide information about the characteristics of the selected product. Some pictograms remain the same as on the old label, some have been modified while others have been newly added.

Dates for the transition to the new labels

→ Retailers had time to change labels between 1 and 18 March 2021. Since then, all the products in question must have new energy labels, including those sold on the internet.

→ Products that are not placed on the market from 1 November 2020 can only be sold with the old labels until 1 December 2021 and then they must be withdrawn from sale.

→ The modification also applies to advertising tools and catalogues, where each product must be labelled with a graphically defined arrow indicating the energy class of the model, and the letter of the energy class must have at least the same font size as that used for the price of the product.

→ From 1 September 2021, the new labels apply to light sources as well. Here too, the deadline of 14 working days for changing labels online applied; but changing labels on in-store packaging – because the labels are printed directly on the packaging – is possible within 18 months.

Energy labels are a tool to protect consumers and save natural resources. It is therefore important to offer them to customers in the proper form and for all the products in question.

Should you have further specific questions about the transition to the new labels from a retailer perspective, you can visit the LABEL2020 project website, which contains, among other things, further details and guidance for retailers: www.label2020.cz/prodejci/

Juraj Krivošík *juraj.krivosik@svn.cz*

Online energy labelling compliance monitoring

Link to the full report

Ecodesign and energy labelling are now widely recognised as efficiency policies and critical tools to reach the European emission reduction targets. E-commerce is steadily growing in the EU, and numerous websites offer energy-using products for sale. More and more consumers who would typically have gone to a store to purchase an appliance were recently forced to select and purchase their product online because of the global pandemic. Ensuring a high level of online compliance is therefore becoming even more crucial both on the consumer and the industry side. Some former projects have, however, reported compliance concerns about energy labelling regulations on the online market.

In-depth monitoring

CLASP has initiated a study covering six EU Member States to monitor the proper display of energy labels and related information on websites. The countries include Belgium, the Czech Republic, Denmark, Germany, France, and Slovakia. Seventy-two websites and 3,000 product pages have been investigated, covering some of the largest online retail sites in the respective countries, specialised dealers, the low-price segment, do-it-yourself and high-end dealers, as well as price comparison websites.

Findings

The most frequent non-compliance issues were related to the location of the energy label or nested display, the format and size of the graphic, the availability of the mandatory product information sheet (product fiche), and the absence of labelling information on some page types (catalogue, basket, comparator, etc.). The evaluation of the practices on price-comparison websites, which have no legal duty and limited labelling information but are highly relevant to consumers, showed a very low level of alignment with energy labelling requirements.

The study establishes a typology of the cases of non-compliance that were encountered during the research – availability, readability, accuracy and additional mentions – and presents a quantitative and qualitative assessment of the level of compliance observed during the monitoring.

Recommendations

Based on online research, stakeholder surveys and other labelling compliance experience, the team developed recommendations to increase online labelling compliance by retailers, which include, among others:

→ raising the awareness of stakeholders about correct implementation via guides and trainings;

→ increasing the visibility of MVE activities to ensure compliance pressure;

→ improving internal awareness and consistency within online retailers, in all relevant departments (including IT, marketing, sustainability, etc.);

→ developing a standardised online labelling module in the form of a ready-to-embed box programmed to display all the necessary information in the right format;

→ clarifying and simplifying the regulations, avoiding superfluous requirements and language that leaves room for interpretation.

Juraj Krivošík *juraj.krivosik@svn.cz*

List of project AntiCSS outputs

Circumventing energy efficiency requirements – laboratory test results

One of the risks of striving to improve energy efficiency is not only potential cheating in product quality, but also the attempt to circumvent regulations and requirements that may not be apparent at first glance during a formal inspection.

Therefore, a consortium of partners associated within the AntiCSS project has carried out a detailed analysis in recent months. This analysis pertains to products from eight product categories for which legislation on energy labelling and minimum energy efficiency requirements is in force.

Product selection included, among other things, a detailed analysis of the current legislation and technical standards under which product testing is carried out, as well as the development of in-house test procedures that can help detect any signs of different "behaviour" or operating parameters of a product once the test procedures have been modified.

The activities then included laboratory testing of selected products from these product categories in independent laboratories as well as detailed evaluation of the results. The results suggest that in a realistic scenario, the "loss" could be between 110 and 487 GWh, or up to 1,662 GWh of primary energy per year.

The results of the tests and other analyses are now available to supervisory authorities, laboratories, manufacturers and others interested in the energy efficiency of products.

Juraj Krivošík juraj.krivosik@svn.cz

CraftEdu

More information about the courses and the project CraftEdu

Digitalisation is heading for education

The last two years have shown us the need for and possibilities of digitalisation in all areas of the national economy. One of the most important areas is education. The necessity to implement distance education has forced teachers to change their long-established practices, introduce new methods and change the content of teaching, too.

The CraftEdu project, aimed at preparing the craft professions for nearly zero-energy buildings, set out to demonstrate seven pilot programmes. We considered hands-on learning in a training centre, on construction sites and at a building fair complemented by classroom learning and collaborative e-learning to make the education attractive to the craft professions.

The need to transform the pilot training programmes has made us develop e-learning substantially, in an effort to maximise interactivity. Contrary to the original plan, we have created educational videos in the form of lectures, practical instructional videos, interactive e-learning, as well as educational e-books. We have thus gained new experience that clearly supports the development of electronic media with the following advantages:

Availability

Digital courses are available at any time; no continuous presence of the lecturer is required.

Modularity

Courses can be divided into individual segments (videos, e-learning, tests) from which the course is then composed.

Flexibility

Tailor-made courses can be shortened, lengthened and rearranged to suit the needs of individual target groups.

The courses, finally implemented for eight selected professions in 2021, have shown that the transformation of training programmes into a digital form makes sense. At the same time, they showed the need to maintain the consultative and exchange component, which is irreplaceable. In the future, a so-called combined education in the form of a very practically oriented physical education and a more theoretical digital education will be advisable.

Jiří Karásek jiri.karasek@svn.cz

NEWS at SEVEn

News at SEVEn is produced in English and Czech by SEVEn, The Energy Efficiency Center. SEVEn strives to promote energy efficiency in order to support economic development and protect the environment. The newsletter informs about current energy efficiency events and developments in the Czech Republic and EU and welcomes outside submissions. SEVEn is located at Americká 17, 120 00 Praha 2, Czech Republic. Editor: Jiří Karásek (jiri.karasek@svn.cz), Juraj Krivošík (juraj.krivosik@svn.cz). Phone: + 420 224 252 115, e-mail: seven@svn.cz, internet: www.svn.cz. Graphic design Pavel Cindr. ISSN 2570-592X. MK ČR E 13241.

PRE EKOPROUD *The Prague office consumes PREKO certified energy which originates by 100% from renewable electricity sources.*

ISO 9001 LL-C (Certification) ISO 14001 LL-C (Certification) *SEVEn holds the ČSN EN ISO 9001:2008 and 14001:2004 certificates issued by LL-C (Certification).*

SEVEn THE ENERGY EFFICIENCY CENTER, z. ú.