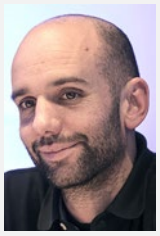
People-Centred Energy Performance Certificates for Buildings

DOMEN BANČIČ
Institute for Innovation and development of University of Ljubljana (IRI UL), Ljubljana, Slovenia
domen.bancic@iri.uni-lj.si



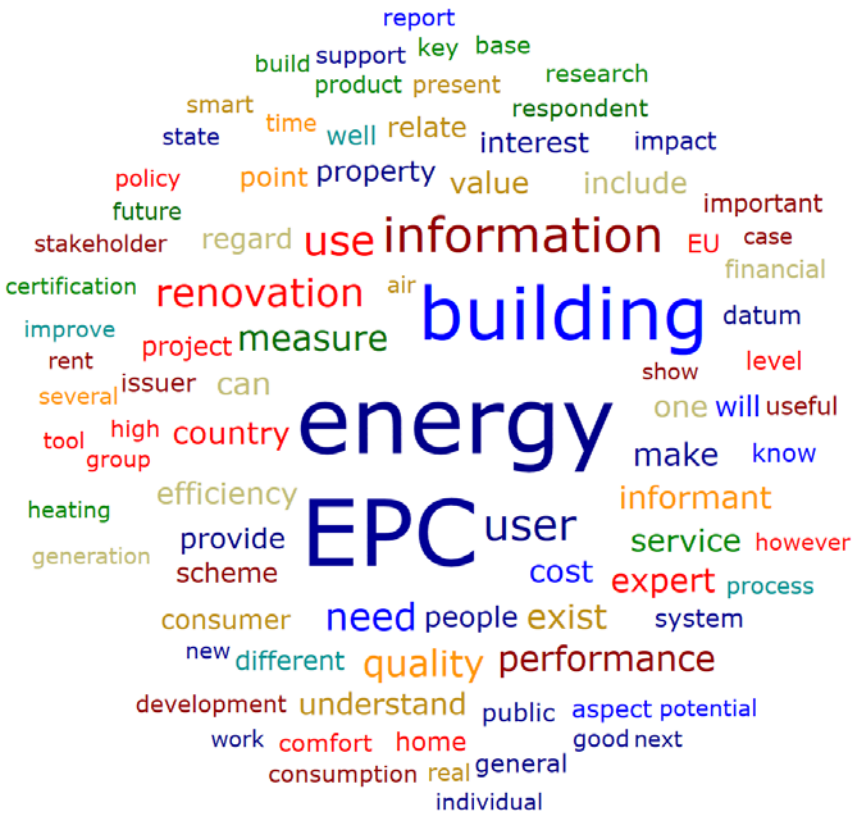
JURE VETRŠEK
Institute for Innovation and development of University of Ljubljana (IRI UL), Ljubljana, Slovenia
jure.vetrsek@iri.uni-lj.si

What do people actually think about Energy Performance Certificates for buildings? This question was the red thread of the web event powered by REHVA[1], bringing together experts and researchers from BEUC – the European Consumer Organisation – and seven Horizon 2020 sister projects of the Next Generation EPCertificates cluster to exchange their thoughts on people-centred EPCs.

Keywords: Energy Performance Certificate, Horizon 2020, People-centred development, Interdisciplinarity

Introduction

Building Energy Performance Certificates (EPCs) have been around for more than 10 years and they are poised to stay. In theory, they exist with a good reason – to indicate energy performance of the buildings we use in our daily lives. For buyers of real estate, EPCs are supposed to serve as a reference point for energy performance qualities of the property they are interested in, and hence as a tool for judging the value of their



investment. For owners and property managers, EPCs should be a reference for assessing the existing condition of the building and support informed decision making in building maintenance, renovation, and management. Finally, for institutions on regional, national and European level, EPCs are conceived as a reference for assessing the overall qualities of the building stock and related policies.

At least in theory, it all sounds great. But does it really work? Is the value implied in theory supporting the implementation of policies and legislation behind EPC schemes being realised? How did the originally foreseen purpose of EPCs translate into reality? And what do people – from homeowners to EPC scheme developers and everyone in between – really think about the EPCs? In search of answers, experts and researchers from BEUC, the European Consumer Organisation[**2**], and seven Horizon 2020 sister projects of the Next Generation EPCertificates cluster came together in a web workshop to share their knowledge. This event came to crown two months of prior exchange of insights and experience as an attempt to make a collective step towards people-centred EPCs.

What do people think about EPCs?

People clearly have very different perceptions and often also contrasting opinions regarding EPCs, much depending on the different roles they assume and knowledge they possess. It goes without saying, that experts with considerable background knowledge will understand EPCs better and think about them differently from people with little idea about the systems, concepts, and parameters that bring EPCs into existence. What is also clear is that there is mounting evidence indicating that EPCs – as they exist today – fail to have much tangible impact on the ground or create real value for their users. In contrast, they are often seen as little more than a self-serving document, needed to meet the requirements enshrined in policies.

Participants of the web workshop[**3**] had a privilege to learn about these issues first hand, from Mr. Guillaume Joly, Sustainable Buildings Officer at BEUC. He presented conclusions from BEUC's sustainable housing position paper[**4**], a document that dives deep into the EU's current and future policies on energy efficiency in buildings from the consumers' perspective. Firstly, BEUC believes EPCs

Figure 1. Focus group participants annotating and discussing elements of EPCs. (IRI UL).

should not be a standalone tool, but should function as a marketing tool integrating a wide scope of advice and support services for customers. Secondly, their members describe implementation of existing EPCs as "diverse" and its adaptation to consumers' profile as "sometimes questionable". He argued there is a need to improve the reliability of the concept, particularly in terms of consistency and trustworthiness of energy performance assessments, and supported his claims with research observations by BEUC associate members from Austria, France, Portugal, and the UK, some of which are also described in the paper.

"EPCs are meant to remain marketing tools and should not be considered as substitutes for energy audits. Improving the reliability and content of EPCs does not and should not have to mean more technical content and significantly higher prices." (Guillaume Joly, BEUC)

Looking to the future, BEUC sees the need for EPCs to guide users towards both easily attainable energy renovation goals, affordable also for low-income households, as well as more advanced options, that require higher investments but also bring higher long-term returns. **EPCs should also be more comprehensive, and particularly less "technical"**, Mr. Joly noted. Presentation of data and information should be easy to read and understand for anyone – consumers, installers, experts, and public authority representatives alike. In addition, EPCs should enable (and prompt) people to act in a timely and informed manner, both from the technical and financial point of view. In this regard, Mr. Joly specifically highlighted the need for EPCs to present a solid reference for meaningful comparison of costs related to energy use (and management) as well as costs related to energy renovation measures, both in their locally specific market context.

BEUC's reflections on existing EPC schemes therefore imply the need for simplicity *and* for content-rich certification services – both at the same time. Thinking these two qualities as complementary in the frame of existing EPC schemes might seem as contradiction in expectations. In the light of future development, however, this is better framed as a challenge. If customizable balance between people-friendliness and depth of information once could be dismissed as science-fiction, today it is discussed as a goal within reach. Calls for further digitalization of the EPC is a common feature of the projects focused on development of EPC schemes, as we shall see later in this article. Their goals, aims, and research-based conclusions not only support BEUC's expectations but indicate they are becoming increasingly viable. U-CERT team, for example, argues for a **modular customization of EPCs according to the user profile and background knowledge** (see **Figure 3**). All this leads to a conclusion, that next generation EPCs should be developed not only with consideration of the variety of data they will entail, but the variety of people that will be using them.

EPC sister projects

The meeting thus continued with a series of presentations by the Next Generation EPCertificates cluster – U-CERT[**5**], QualDeEPC[**6**], X-tendo[**7**], ePANACEA[**8**], EPC RECAST[**9**], D^2EPC[**10**], and E-DYCE[**11**]. Although each project has its own particular focus and approach to improving the existing EPC schemes, they share a number of goals and principles:

- User-friendliness of EPC related products and services,
- Support decision making for energy renovations,
- Innovation in the area of indicators and data handling/use (comfort, sustainability, Smart Readiness, financial etc.),
- Enhancement of EPC assessment, certification, and verification,

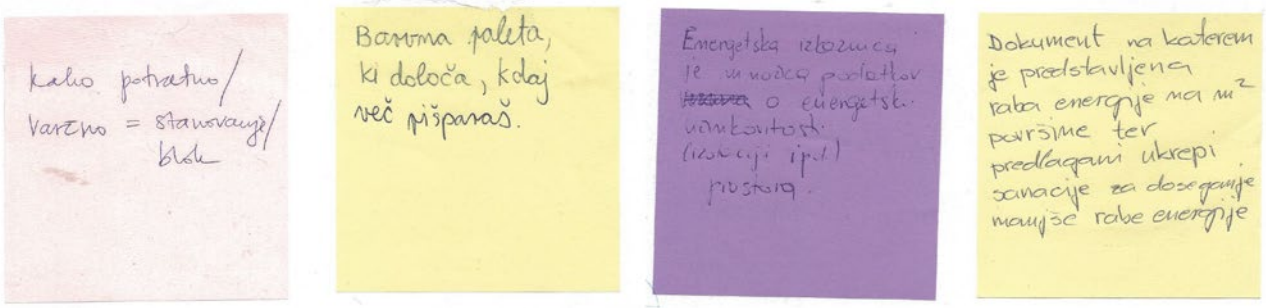


Figure 2. Definitions of EPCs shared by focus group participants in Slovenia. (IRI UL).

- Exchange of knowledge and experiences,
- Improved links between EPCs and (deep) energy renovation planning,
- Enhanced quality and reliability of EPCs,
- Economic feasibility of EPC schemes,
- Development in direction of dynamic and responsive EPCs,
- Compatibility and comparability of EPCs in the wide EU framework based on the EPB standards (M/480 mandate),
- Enhanced interaction between people and the built environment for conscious building use and management,
- Support to assessors and issuers (training, tools, methodologies etc.),
- Compliance and comparability based on international standards, etc.

U-CERT

Large part of the workshop was devoted to the presentation of U-CERT's approach to people-centred research and development. U-CERT aims to enable evaluation of building energy performance in a holistic and cost-effective manner. During the presentation of their ethnographic research case, U-CERT team illustrated how qualitative research can provide deep insights into the backdrop of everyday-life in which products and services developed within Horizon 2020 projects are destined to exist. Deep qualitative insights, they argued, has the power to keep the focus of project developments on course by verifying (or falsifying) the existing research questions, and opening new ones that previously might not be considered or were considered less relevant.

Is enforcement by means of policy and legislation really the only way to implement minimum building performance requirements, and particularly the EPCs? Or is there a way to realize them in a way for everyone to recognize them as meaningful and complementary to everyday life?
(Domen Bančič, U-CERT)

U-CERT researchers from 11 countries together conducted 101 interviews and 11 focus groups. In total, 191 research participants from both expert (88) and non-expert (103) background were engaged in an extensive collaborative process resulting in wealth of qualitative data and information on People's perceptions regarding EPC schemes[**12**]. The research revealed a discrepancy between the theory surrounding EPCs and how they are in practice often experienced as an "administrative necessity" designed for expert use. **Various avenues for potential improvement of the concept were identified** (see **Figure 3**), all revolving around one key aspect – creating user-centred value. U-CERT representatives rounded up their presentation by suggesting the key first step in development of next generation EPCs is to specify the limits of the concept, both with regard to how it relates to and how it differs from other evolving concepts and tools, such as (overarching) BIM, Energy Audits, Inspections, Building Renovation Passports, Digital Building Logbooks etc.

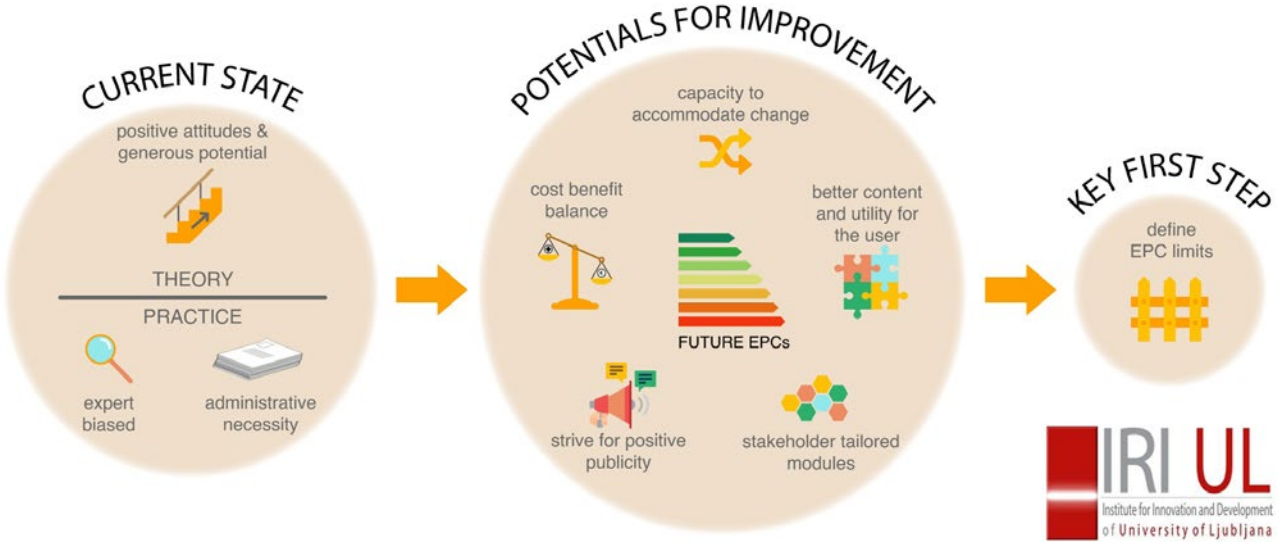


Figure 3. Infographic outline of the ethnographic research outcomes by U-CERT. (IRI UL).

QualDeEPC

QualDeEPC is focused on quality and convergence of EPC schemes across the EU, as well as stressing the link between EPCs and deep renovation. They maintain an intensive dialogue with key stakeholders, using methods such as interviews and workshops to identify gaps in current EPC schemes[**13**]. Their development priorities are focused around seven key points:

1. Improved recommendations for building renovations,
2. An online tool connecting EPC recommendations to deep energy renovation,
3. Deep renovation network platforms,
4. Improved training for EPC assessors,
5. User-friendliness of EPCs,
6. Guidelines for effective promotion and advertisement of EPCs, and
7. Ensuring use of EPCs in real estate advertisements – not only by advocating for stricter policies regarding compliance, but also proactively, by providing concrete advertisement guidelines.

X-tendo

X-tendo is supporting public authorities to implement the next generation EPCs properly, and support them with best possible management and organisation. To optimize their work with regard to the needs of the people, they carried out a survey[**14**] for understanding end-users' needs and expectations in five countries – Poland, Portugal, Greece, Romania, and Denmark. The sample took in more than 500 people per country, and included homeowners, landlords and tenants. The survey was tailored to deepen the project's understanding of people's perception towards the development of the following 10 features of EPCs:

- Smart-Readiness
- Comfort
- Outdoor air pollution
- Real Energy Consumption
- District Energy
- EPC Databases
- Building Logbook
- Tailored recommendations
- Financing options
- One-Stop-Shop

ePANACEA

ePANACEA works towards modular EPC schemes based on machine learning, automatization, and digitalisation. In their research, they make use of intense dialogue with EPC users and other stakeholders as a feedback loop on project developments. By the end of March 2021, they have done 63 interviews and 6 user-needs workshops in 5 pilot countries – Spain, Belgium, Finland, Austria, Greece and Germany. Similar to the findings presented by BEUC and U-CERT team, participants of ePANACEA research characterized existing EPCs in a variety of ways – as "obligatory document", "completely standardized", "the only document mapping the as-built situation", "policy instrument for the energy transition in the building sector" etc.

"Prospective buyers of a building ask for the EEC [Energy Efficiency Certificate, e.i. the EPC] without evaluating the actual meaning." (mechanical engineer, Greece)

On the basis of these interactions, ePANACEA concludes EPCs are used for contractual actions, and not as a document that would support any kind of decision making. In their report on Stakeholder Analysis[**15**], the ePANACEA researchers note an important fact – people's worldview is dynamic. Their perceptions, attitudes, needs and wants, are prone to change. This is why ePANACEA will continue working with people for the duration of the project, particularly on the topic of user acceptance, to ensure project developments stay on the right track.

EPC RECAST

The aim of EPC RECAST[**16**] is to support the work of EPC assessors. They focus on innovative on-site data collection methods, use of measured data, public databases, quality check procedures, and model calibration

"Our goal is not to replace professional EPC assessors, but instead to better and further support their work in order to achieve improved EPC reliability, comparability in between building assets, user-friendliness and to ultimately generate an impact for owners and occupants to engage them on a tangible pathway to efficient energy retrofit." (EPC RECAST team)

– all to improve the overall reliability of EPCs. The pathway to their goal, which is to develop a prototype cloud system toolbox for EPC assessors, is being mapped through an iterative co-design approach. This involves both building owners and assessors working together with EPC RECAST experts on development

Follow the ongoing Horizon 2020 projects!

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E-DYCE
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of an optimal EPC assessment process and outputs. EPC RECAST also has a strong emphasis on connecting EPCs with building renovation, particularly by including improved recommendations on possible renovation measures in the next generation EPCs and linking EPC input/output information with digital logbooks.

D^2EPC

For D^2EPC[**17**], the key are dynamic EPCs based on multi-parameter assessment and innovative indicators. These will support people's deeper understanding of their interaction with the built environment and drive decision making for improvement of energy performance. The project's focus is on BIM-based Digital Twins in combination with a state-of-the-art IoT ecosystem for the near-real time asset and operational energy assessment of the building. They also aim to improve assessment recommendations by means of AI designed to enhance conscious energy consumption and support optimized balance of comfort and energy efficiency. Part of their strategy is also turning EPC registries into a mechanism that informs policy making, specifically by integrating geolocation and "polluter pays" practices into the next generation EPC concept. To steer the development of the project, D^2EPC used desk research and questionnaires to identify a set of challenges and recommendations for the next generation EPCs. They focused on drawbacks of existing EPCs and relevant future trends, all from the standpoint of both experts and users.

E-DYCE

E-DYCE[**18**] is focused on development of EPC calculation methodology. It is focused on dynamic certification based on openly available resources and tools. They aim to empower EPC users with accurate and clear feedback functionalities designed to increase people's awareness of building operation. They see timing as essential – providing tenants, owners, and management authorities with the information necessary to make correct interventions to optimize building performance in real time. To pave the way to success, E-DYCE plans to install monitoring equipment in dedicated demonstration buildings to explore people's acceptance and understanding of the purpose of monitoring the indoor environment and energy consumption, which will enable informed identification of barriers that state-of-the-art energy certification methods, tools, and technologies are facing in the real-life environments.

Takeaways

The presentations ended with a short debate that gave rise to some interesting discussion points:

- *"How do we set the limits of EPCs? Where do EPCs end and where do other concepts, like Building Logbooks, start?"* (Jure Vetršek, U-CERT)
- "*Should it* [an EPC] *give guidance in the moment when there is a real estate transaction? Should this be the main starting point or should it* […] *be giving more advice regarding renovation activities, even regarding energy related behaviour?"* (Lukas Kranzl, X-tendo)
- "*Expert recommendation is to separate the EPC-scheme from a tool to provide feedback about real energy consumption.*" (Laura Muhr, ePANACEA)

Questions were unfortunately left largely unanswered, in part also due to time restrictions. One thing, however, is clear – the EPCs are gradually gaining on significance. One could say that such conclusion should come as no surprise since EPCs are, after all, enshrined in the national legislation. In this regard, EPCs are not so much a technical but a political (regulatory) tool, and an important one indeed. We *need* to reach Carbon emission targets, and for that – for better or for worse – we need legislation that sets due direction for the future.

What we also need, however, are significant improvements of the existing certification schemes. The workshop in itself is both a proof and a statement of confidence that EPCs are evolving and that such positive change is at our doorstep. Interdisciplinary teams of experts and scientists from across the EU demonstrated that we are – collectively – working our way towards improvements. On this way, we deal with similar dilemmas, and come to complementary conclusions. These prove that EPCs could – and should – be more than just an "administrative necessity", and that they can be a meaningful tool in the effort for making buildings healthier, energy efficient, carbon neutral, and environmentally sustainable on the long run. In the light of such prospects, EPC schemes deserve our attention and efforts to enhance their positive impact.

Most importantly, however, we must continue to work our way towards these goals by putting people first. Issues related to specific technical, methodological, or

theoretical aspects clearly are important and need to be addressed. Nonetheless, the **everyday-life perspective of experts, users, policy makers, and other people that give meaning to EPCs simply must not be neglected**. Good ideas such as the existing EPC and all of its potential future improvements, no matter the quality of expertise or science that conceives them, are otherwise less likely to prosper in practice. Experiences shared by the workshop participants indicate that including people in interactive interdisciplinary research and development processes leads towards development of meaningful solutions in favour of the environment and the people. Join us on our journeys of addressing the challenges of today to co-create people-centred EPCs and buildings of the future. ■

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References

[1] Webinar recording: Building Energy Performance Certificates for the people. RHEVA website: <https://u-certproject.eu/news/recording-web-workshop-u-cert-building-energy-perf/>, 14.5.2021.

[2] BEUC: The European Consumer Organisation. BEUC website: < https://www.beuc.eu/>, 14.5.2021.

[3] Webinar recording: Building Energy Performance Certificates for the people. RHEVA website: <https://www.rehva.eu/knowledge-base/webinar-details/recording-webinar-building-energy-performance-certificates-for-the-people>, 14.5.2021.

[4] How to Make Green and Healthy Housing Affordable for All Consumers: BEUC Position Paper. BEUC website: <https://www.beuc.eu/publications/beuc-x-2021-019_how_to_make_green_and_healthy_housing_affordable_for_all_consumers.pdf>, 14.5.2021.

[5] U-CERT project. EC CORDIS website: <https://cordis.europa.eu/project/id/839937>, 14.5.2021.

[6] QualDeEPC project. EC CORDIS website: <https://cordis.europa.eu/project/id/847100>, 14.5.2021.

[7] X-tendo project. EC CORDIS website: <https://cordis.europa.eu/project/id/845958>, 14.5.2021.

[8] ePANACEA project. EC CORDIS website: <https://cordis.europa.eu/project/id/892421>, 14.5.2021.

[9] EPC RECAST project. EC CORDIS website: <https://cordis.europa.eu/project/id/893118>, 14.5.2021.

[10] D^2EPC project. EC CORDIS website: <https://cordis.europa.eu/project/id/892984>, 14.5.2021.

[11] E-DYCE project. EC CORDIS website: <https://cordis.europa.eu/project/id/893945>, 14.5.2021.

[12] EPCs for the People. U-CERT website: <https://u-certproject.eu/proceedings/epcertificates-people/>, 14.5.2021.

[13] Report on EPC short-comings and national priority approaches to their resolution. Qual DeEPC website: <https://qualdeepc.eu/wp-content/uploads/2020/04/QualDeEPC_D2.3_EPC-shortcomings-and-national-priority-approaches_final-20200422.pdf>, 14.5.2021.

[14] Understanding End-User Needs and Expectations of the Next-Generation Energy Performance Certificates Scheme. X-tendo website: <https://x-tendo.eu/wp-content/uploads/2020/10/X-tendo-D2.4-end-users-survey.pdf>, 14.5.2021.

[15] Stakeholder Analysis Report. ePANACEA website: <https://epanacea.eu/index.php?wlmfile=/wp-content/uploads/2020/12/ePANACEA-D3.1-Stakeholder-Analysis-V1.pdf>, 14.5.2021.

[16] Energy Performance Certificate Recast. EPC RECAST website: <http://epc-recast.eu/>, 14.5.2021.

[17] Dynamic Digital Energy Performance Certificates. D^2EPC website: <https://www.d2epc.eu/en>, 14.5.2021.

[18] The Dynamic Perspective of the Energy Performance Certification. E-DYCE website: <https://edyce.eu/>, 14.5.2021.

[19] U-CERT Project: User-Centred Energy Performance Assessment and Certification. RHEVA website: <https://www.rehva.eu/eu-projects/project/u-cert>, 14.5.2021.