The smartness indicator

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With the growing share of renewable energy by PV and wind, balancing energy supply and energy needs become increasingly important. Smart building management and response becomes therefore crucial.

At the building level itself, smart building design and control technologies can improve indoor climate conditions and at the same time empower building occupants by providing information on energy use and indoor climate conditions. This can also result in a reduction of the energy needs and possible response in times where supply and needs are out of balance.

Finally, smart building technology can also help to operate the building more efficiently, including support regarding maintenance and repair.

Smart Buildings will first of all, as mentioned, give an option for additional savings, because of the use of new technology, but it will also be possible to aim at savings when the pick load is high or when production of renewable energy is low.

Further it will be possible to shift the energy use so that reductions fall when the use of energy is high or to directly shift from high load / or stressed situations to a time when energy supply is high compared to the demand for instance, if there is a strong wind.

Savings by smart elements in buildings are interesting for the users because these often come at relative low costs, while shifting in the load is interesting because they can offset kWh's, which are produced at high costs. With Smart meters, consumers can be awarded for savings at the right time, by higher prices per kWh for these savings.

Smart Buildings can therefore both support the transition towards NZEB buildings and the further uptake of renewable energy in the energy supply.

Therefore, it seems logical to complement the indicator of the energy performance of a building, as reflected by the Energy Performance Certificate (EPC), with an indicator of the smartness of a building.

As part of the proposals released by the European Commission on November 30 2016, the introduction of such a 'smartness indicator' is foreseen.

QUALICHeCK

QUALICHeCK responds to the challenges related to compliance of Energy Performance Certificate (EPC) declarations and the quality of the building works. Find out more at http://qualicheck-platform.eu.

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With respect to the features of this smartness indicator, the following description is provided:

A smartness indicator will reflect the ability of buildings to

(i) adjust to the needs of the user and empower building occupants providing information on operational energy consumption (complementing the energy performance information provided in the EPCs),
(ii) ensure efficient and comfortable building operation, signal when systems need maintenance or repair, and
(iii) readiness of the building to participate in demand response, charge electric vehicles and host energy storage systems.

Further the proposal gives a rational and some indications for the proposed indicator, as the documents published on November 30 provide the following information:

- "… The EPBD will be amended to empower the Commission to develop a framework calculation of a smartness indicator and enable the implementation of a common framework to assess and certify smart-readiness. …"
- "… During a transaction, this indicator will act as a reward mechanism for buildings with a high level of energy performance-oriented smartness, which can be achieved through ICT-based solutions such as: electronic monitoring systems, remotely controlled equipment/systems, predictive features, self-diagnosis and adaptability… ."

It is clear that such smartness can provide large savings as such solutions constantly enhance and at the same time get cheaper. Especially it can play a large role if it is combined with earmarked "Smart Finance" as indicated in the proposal of November 30. The estimations of the environmental and economic impact are provided (**see Table below**).

The proposal by the European Commission also gives indications about the costs aspects of this smartness indicator:

"This measure implies the assessment of the smartness of buildings.

For the cost valuation, it is assumed that the smartness is systematically included on EPCs. This brings an additional administrative cost to the issuing of EPCs.

The public administration would need to add another item/field to existing EPC databases on the smartness indicator, and conduct the corresponding compliance checking.

However, this is to be integrated within the existing certification systems, so no additional compliance checking costs would be incurred. Business and citizens would need to pay for the additional costs of collecting data to assess the smartness of the building.

Administrative costs for the public sector:

One-off cost of adapting the existing EPC database to include the indicator estimated in 25,000€ per country.

Administrative costs for the private sector:

The additional cost of assessing the smartness of the building is estimated to be 20€ (10% of the average cost of EPCs, i.e. 15€ for residential and 100€ for non-residential).

The number of EPCs issued between 2020 and 2030 was considered to be the same as the total number of EPCs issued between 2005-2015 which was close to 16 million, so on average about 1,6 million per year, of which the vast majority was issued for residential buildings (>95%)"

Measures	Impacts on savings in 2030	Impacts on annual energy expenditures in 2030	Impacts on associated construction activity (annual average for 2020 - 2030)
3B. Framework for the introduction of a smartness indicator	8 – 10 Mtoe	8 – 10 bn€/a	5 – 6 bn €/a

As part of the preparation of such smartness indicator, a call for tender was set up (ENER/C3/2016-554) with as deadline for submission September 1 2016. The work programme foresees also consultation with stakeholders. The indicative list of stakeholders to be consulted gives a good idea of the range of stakeholders involved in Smart Buildings:

Primary stakeholders: manufacturers, suppliers and installers of building/home energy producing and consuming ICT equipment and products and systems integrators. As many as possible of the following associations or group of stakeholders/industries should be involved:

- Manufacturers and suppliers of white goods
- Manufactures, suppliers and installers of HVAC, plumbing, security, electrical systems including electrical recharging infrastructure providers
- Manufacturers and suppliers of lighting equipment
- Manufacturers and suppliers of sensors, controls, automation systems and actuators (e.g. for windows, doors, stores) and monitoring equipment for buildings
- Manufacturers and suppliers of micro renewable home/building solutions (solar panels, solar heaters, wind, etc.)
- Manufacturers and suppliers of multimedia, user-friendly displays or interface applications and home computer equipment
- System integrators

Other relevant industries:

- Construction and ICT industries associations
- Facility Management and Building Control industry association
- ESCO or in general Energy Services Providers association
- Data management and cloud-service industries association
- IoT industry association
- Utilities and operators of the power grid association (e.g. smart meters association)

Standardisation Bodies and Organisations, such as: ETSI M2M group, CENELEC TC59x WG7, Smart Grid/Smart Home Activities, HGI Home Gateway Initiative, buildingSmart International, O.A.SIS Open Building Information Exchange (oBIX) and OSGi

If and how the smart indicator becomes a part of the EPBD amendment depends on the negotiations in the European Parliament and the Minister Council.

On February 14, the EPBD Concerted Action organised an event in Malta entitled "Smart Buildings for a greener Europe: Emerging Policy and Practice", whereby specific attention was given to the smartness indicator, but also practical projects were presented. Recordings of the whole event are available on their website* including presentations and round table discussions:

- The role of smart buildings for energy efficiency – Doris Österreicher, University of Natural Resources and Life Sciences, Vienna
- The emerging practice in Malta for smart buildings – Greta Caruana Smith, Building Regulation Office, Malta
- Smart buildings in the context of the EPBD – Sylvain Robert EC DG Energy
- Voluntary certification for automation and controls – Stephan Kolb, eu.bac
- Demand response in blocks of buildings – the DR BOB project, Vladimir Vukovic, Teesside University
- Innovation in smart buildings under Horizon 2020 – Amandine Lacourt and Philippe Moseley, EASME
- Smart buildings in a decarbonised energy system – Maarten De Groote, BPIE

* http://www.epbd-ca.eu/archives/1363

It is not yet clear what will be the precise specifications of this smartness indicator and the related calculation procedure, nor its impact in daily building practice. It seems however obvious that it should be closely linked to or integrated in the Energy Performance Certification of buildings. But will it be expressed in one or more numbers? In a new scale? Will it be only informative or will it be also used as a basis for new requirements?

Within the framework of the QUALICHeCK project, a substantial part of the activities has been focused on identifying challenges for obtaining compliant and effective EPC results and possibilities for an effective compliance framework.

With respect to this envisaged smartness indicator (SI), the following recommendations can be formulated:

- It is important that the SI reflects the status after the construction works and not only at the design stage as changes often are implemented between design and execution
- It is essential that there are very clear procedures for coming to input data for determining the SI and what to do, if this information cannot be provided
- The use of databases with compliant data and technologies can be very helpful and can help to keep costs low
- It is also important to have a clear framework for dealing with and supporting innovation. This is in particular a challenge for this domain since innovation in the area of smart control and design will be very considerable in the coming years.
- Change in boundary conditions over time might be an important element to cover in the SI. E.g. how to reflect preparation for changes in the SI; for instance, if a given building, heated by a condensing boiler is designed in such wat that it will be easy to replace the boiler by a heat pump or to add and integrate renewable sources?
- It is important to have a framework, which reflects not only if a building includes smart elements, but also its capacity to respond to or implement further smart controls in the future.
- Finally it is important that the SI includes assessment of the building as a hole, its smart controls and equipment, but also how this interacts with the grid and the surroundings including other buildings in the neighbourhood.

The challenges regarding the robustness of the SI is large, but it depends to a high extent of the use, which will be made of the SI. In case it is only voluntary information, the challenges are more limited. However, if it will become a general requirement and/or a requirement in private contracts, the challenges will be bigger, in particular if the requirements on these SI elements will be severe. ■