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Horizon 2020 Energy Efficiency Call for Proposals 2020

Energy Societal Challenge

Buildings in energy transition (B4E)

1st Deadline: 15 January 2020

- B4E-1-2020: Towards highly energy efficient and decarbonised buildings (CSA)
- B4E-5-2020: Integrated design concepts for energy-efficient ICT in buildings (IA)
- B4E-6-2020: Big data for buildings (IA)
- B4E-7-2020: European building stock data 4.0 (CSA)
- B4E-8-2020: Renewable and energy efficient solutions for heating and/or cooling, and DHW production in multi-apartment residential buildings (IA)
- B4E-9-2020: Support to the coordination of European smart buildings innovation community (CSA)
- B4E-10-2020: Self-assessment and self-optimisation of buildings and appliances for a better energy performance (IA)

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Buildings in energy transition (B4E)

2nd Deadline: 10 September 2020

- B4E-2-2020: Stimulating demand for sustainable energy skills in the building sector (CSA)
- B4E-3-2020: Upgrading smartness of existing buildings through innovations for legacy equipment (IA)
- B4E-4-2020: Next-generation of Energy Performance Assessment and Certification (CSA)
- B4E-14-2020: Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side (CSA)

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Challenge

Type of action: CSA (100%)
Opening: 16/7/19 - Deadline: 15/1/20

- Long-term climate and energy targets call for higher rate of building renovation
- New technologies, processes and business models are needed
- Deep renovations need to become more attractive, reliable, less disruptive for occupants, less energy-intensive (LCL – perspective) and environmentally friendly
- Deep renovations need to prepare the role of buildings in the energy system of the future (flexibility, storage and RES generation)
- Holistic consumer centered solutions with high comfort levels and high quality indoor environment.

Scope

- Demonstrate that deep / NZEB renovation is more reliable, faster, cheaper & easier to implement than standard practices & avoid negative impact on environment and health
- Demonstrate seamless & cost-effective integration of clean energy solutions enabling buildings to play active role in energy system
- Demonstrate high replication potential of proposed solutions, including viable renovation financing concepts
- Tackle relevant market barriers & involve relevant stakeholders in communication & dissemination

Impacts

- Primary energy savings triggered (GWh/year).
- Investments in sustainable energy (million EUR).
- Replication of the renovation approach leading to increase deep / NZEB renovation rate at large scale.
- Number of public or private renovation schemes set up.
- Building renovations triggered (n° of dwelling or square meters).
- When possible: GHG reduction (tCO2-eq/year), air pollutants reduction (kg/year), RES generation (GWh/year)

Challenge

Type of action: IA (70%)
Opening: 5/3/20 - Deadline: 10/9/20

- Changing role of buildings from consuming energy to distributed energy generation, energy storage, smart charging of EVs, smart metering, load reduction and load shifting through demand response
- Innovative technologies will enable smart buildings to interact with their occupants and the grid in real time
- Smart upgrade of building systems (such HVAC, DHW), is more difficult due to higher costs of replacement and longer lifecycles, however remains highly relevant for buildings interactions with the energy system

Scope

- Develop and demonstrate cost-effective low-carbon technological solutions to manage energy within existing buildings and interact with the grid providing energy efficiency, flexibility, generation and storage
- The solutions should focus on cost-effectiveness and user-friendliness
- Pilots to involve appliances and technical building systems
  - with longer lifecycles (boilers, radiators, DHW, ventilation, lighting etc.) and
  - with shorter lifecycles (dryers, washing machines, fridges, etc)
- Business model development and a clear path to finance and deployment

Impacts

- Primary Energy savings triggered by the project (in GWh/year)
- Investments in sustainable energy triggered by the project (in m€)
- Upgrade of existing buildings to higher smartness levels
- Reduction in energy consumption and costs, exceeding the additional consumption from IT and its cost

Challenge

Type of action: IA (70%)
Opening: 16/7/19 - Deadline: 15/1/20

- ICT sector in general (including data centers) generating up to 2% of global CO2 emissions, and its carbon footprint is growing significantly
- Demand for data processing growing fast with emergence of edge computing, IoT, and faster communication networks
- Improve energy efficiency of small data centers or server rooms within buildings
- Integration of these systems with building energy systems, renewables, heating and cooling systems, etc.

Scope

- Optimal energy performance of design concepts for small DC or server rooms (maximum 250kW per pilot)
- At least 3 pilots in 3 different countries and climatic conditions
- Integration with buildings energy systems and renewable energy sources
- Minimising total waste heat production and valorising of waste heat
- Geographical and temporal workload balance
- Elimination of unnecessary power conversions (AC/DC)
- Operation of ICT equipment in a wider range of temperatures

Impacts

- Demonstration and dissemination of innovative optimal design concepts
- Guidelines and good practices for server rooms and small data centers in buildings
- Evidence of lower environmental impacts, reduced energy consumption and CO2 emissions through the life cycle
- Power Usage Effectiveness (PUE) lower than the best performing small data centre solutions in a given location
- Market uptake of innovative solutions and technologies

Challenge

Type of action: IA (70%)
Opening: 16/7/19 - Deadline: 15/1/20

- Buildings produce an increasing number of data on energy generation and consumption
- Collecting and making available reliable data on buildings can lead to:
  - enhanced consumer information
  - effective management of energy grids
  - creation of innovative energy services, business models and financing schemes
- Produce statistics, business intelligence and predictive models that will enable reliable and effective policymaking

Scope

- Define a reference architecture for buildings data
  - Integration with existing dataset formats, legacy architectures etc
  - Compatibility with smart meters, sensors, IoT devices, BMS, existing databases
- Develop and pilot an open, cloud-based data analytics toolbox
  - process big sets of data and perform Statistical Analysis, Data Visualisation, Business Intelligence (BI) and Predictive Modelling
  - integrate of state of the art data science technologies like Statistics, Artificial Intelligence (AI), Machine Learning (ML) and Deep Learning (DL)
  - support third party development of services and business models
- Access to existing large-scale real datasets

Impacts

- Standardisation of European buildings data
- New data-driven business models and innovative energy services
- Better availability of big data and big data analysis facilities for real-life scale research
- Engagement of key stakeholders
- Up-take of innovative monitoring and verification of energy savings
- Integration of relevant digital technologies in the buildings sector

B4E-8-2020: Renewable and energy efficient solutions for heating and/or cooling, and DHW production in multi-apartment residential buildings

Challenge

Type of action: IA (70%)
Opening: 16/7/19 - Deadline: 15/1/20

- Buildings are becoming a factor in the generation of renewable energy and energy storage, but are not generally applied to their full potential
- The high potential of renewable system applications in multi-apartment residential buildings is demonstrated
- Renewable energy supply system application is a great opportunity to reduce fossil fuel consumption for existing multi-apartment residential buildings
- Cost of heating and cooling energy should be reduced to optimal levels

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Scope

- A need to demonstrate the cost-effective heating and DHW units installed in multi-apartment residential buildings
- The proposed solutions with all support systems should already have been validated in an operational environment
- The competitiveness in the building value chain and its position in growth markets should be elaborated
- The costs and energy benefit calculations should be developed in a user-friendly manner suitable for convincing potential end users
- The system should be scalable for different types of multi-apartment residential buildings

Impacts

- Renewable energy production (in kWh /year),
- Primary energy savings and GHG emission savings triggered by the proposed solutions (compared to best available solution existing today),
- Competitiveness of the heat delivered by the proposed solutions (compared to best available solution existing today),
- Scale of the replicability and scalability potential of the proposed solutions,
- Reduction of pay-back time

Challenge

Type of action: CSA (100%)
Opening: 16/7/19 - Deadline: 15/1/20

- The revised Energy Performance of Buildings Directive requires the establishment of a Smart Readiness Indicator (SRI) for buildings
- The SRI will allow for rating the ability of buildings to adapt their operation to the needs of the occupant and to signals from the grid, and overall to optimise energy performance
- Since 2014, the EU has been supporting at least 64 projects relevant to this new definition of smart buildings
- Most challenges faced by smart buildings are common, such as engaging building occupants, connecting and managing various devices and systems, achieving optimal building operation, or integrating buildings to energy markets.

Scope

- Facilitate the flow and exchange of information between EU-funded projects in the field of smart buildings
  - Map out the European smart buildings innovation community
  - Coordinate communication, contribution and participation of the community
  - Encourage and support the promotion, and roll-out of the SRI in the EU
  - Suggest priorities for EU support to research, innovation and market uptake in the field of smart buildings
- Focus on efficiency in breaking silos and bridging the gaps between innovation, markets and policy

Impacts

- An overview of the main stakeholders of the EU smart buildings innovation community
- Organise at least 6 workshops to facilitate the exchange of information between R&I and market uptake projects
- Participate in at least 6 major events to increase visibility of innovation in the field of smart buildings
- Coordinate contributions of the EU smart buildings innovation community to the SRI promotion and to other policy or technological initiatives.

Challenge

Type of action: IA (70%)
Opening: 16/7/19 - Deadline: 15/1/20

- New technologies allow for better data collection and processing
- Advance the measurement, reporting and assessment of actual energy performance and consumption
- Performance may evolve, i.e. decrease, over the lifetime
- For certain products, a specific challenge comes with the software or firmware updates

=> Self-assessment of the actual energy performance of products to achieve or maintain better energy efficiency at appliance level (and by extension in the building) is important.

Scope

- Develop and demonstrate cost-effective technological solutions for the self-assessment and reporting of actual energy performance;
- Ensure the energy-optimisation functions at building, system or appliances level based on real time and historical data.
  - For products, collect real-time data (as a system or stand-alone; aggregated at building level); if regulated under Ecodesign and Energy Labelling, benchmark energy consumption against respective legal provisions
  - For buildings, demonstrate self-assessment, address any underperformance, also over-time

TRL 6-8

While…

- involving pilots for several types of products and technical building systems (different lifecycles, operating modes, user settings);
- investigating how self-assessment solutions could support
  - a forward-looking evolution of energy performance assessment practices
  - a cost-effective, performance- and data-based assessment of the smart readiness of a building;
- considering activities (e.g. training) for installers and service providers;
- involving key stakeholders (appliance manufacturers, BEMS technology providers, installers etc.)

Impacts

- Primary Energy savings (GWh/year)
- Investments in sustainable energy (in million Euro)
- Assessing energy performance and energy consumption with greater accuracy
- Contribution to forward-looking calculation under the EPBD and EU product efficiency legislation
- Investments in smart technologies
- Reduction in energy consumption and costs, exceeding the additional energy consumption from ICT equipment and related cost.

B4E-14-2020: Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side

Challenge

Type of action: CSA (100%)
Opening: 5/3/20 - Deadline: 10/9/20

Potential for Energy (Efficiency) Services not sufficiently tapped while new technologies enabling new types of innovative, bundled services:

- better control and steering of consumption according to market and system needs and availability of RES;
- integration of energy services with non-energy benefits (such as comfort).
- accurate monitoring and verification of energy savings and flexibility through data generated by ICT

-> thus providing for appropriate remuneration of optimised consumption

➢ New opportunities for business models tapping new target groups, sectors and financial resources.

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Scope

Actions should take up and advance smart energy services concepts evolved in the market and proven in projects

- integrating EE services with other energy services (e.g. distributed generation, demand response, e-mobility etc.)
- integrating EE services with non-energy related services (e.g. comfort, health and safety)
- factoring in customer individualised energy services benefitting from a better understanding of behaviour and from new data analytics tools, while
  - ✓using more accurate and dynamic measurement and verification (e.g. through 'big data")
  - ✓addressing potential legal and contractual aspects

Impacts

- Improved viability of innovative energy services;
- Growing offer and up-take of services combining energy efficiency with other energy services, technologies and non-energy benefits;
- Growing up-take of innovative data gathering and processing methods in the monitoring and verification of energy savings and flexibility;
- Application of methods and concepts to ensure that innovative energy services are reliable and verifiable.


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Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing (NMBP) – Energy Efficient Buildings PPP-
DG RTD
Energy

Topic LC-EEB-04-2020: Industrialization of building envelope kits for the renovation market (IA)

Specific Challenge:

Research and Innovations is necessary for **all-inclusive envelope industrialised solutions** addressing **deep renovation** of buildings that are sufficiently **flexible** and **customisable** to address significant market segments in EU reaching Near Zero-Energy Building.

Scope:

Proposals should include at least the following elements :

- Develop **plug & build smart components and modules** with the specific connecting and controlling parts and with options to integrate a large panel of different elements (heating and cooling elements, ventilation, smart windows, energy production, harvesting, storage …)
- **Decision support tools** for the **selection of the refurbishment solution** based on LCA/LCC, addressing environmental impact, cost & energy use and improvements of indoor environment, considering embodied energy, use of resources, material losses, moisture performance, maintenance costs, possible disassembly and consequent recyclability
- Adaptable and scalable **Building Management Systems** (BMS)
- **Prepare market uptake**: case modelling applications, analysis prior to installations, guide for installers and support for decommissioning
- **Prepare industrial uptake** at a large scale, meeting eco-construction and eco-production standards
- **Demo:** retrofit the whole envelope of 2-3 residential buildings in different climate zones plus at least three virtual demos of the plug & play elements

Expected impact:

- Demonstrate retrofitting **plug & build solutions and tools** reaching NZEB standards renovations suitable for mass production;
- **Decrease of retrofitting time and costs by at least 50%** compared to current renovation process for the same building type;
- Improve Life Cycle Assessment (LCA) standards;

TRL: 5-7

Type of Action: Innovation Action

Budget: 6-8M euros

Topic LC-EEB-08-2020: Digital Building Twins (RIA)

Specific Challenge:

- Go beyond the data provided through BIM
- Facilitate monitoring of activities and comparison of relevant data against the initially agreed planning
- Answer to the lack of open semantic interoperability standards
between actual BIM and future BIM

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Scope:

digital building twin – a real-time digital representation of a building or infrastructure

Proposals should include at least :

- Automated quality and progress monitoring to verify that the completed work is consistent with plans and specifications;
- Tracking of daily changes in an as-build model, allowing early detection of discrepancies;
- Avoiding over-allocation of resources by dynamic prediction of requirements;
- Assurance of the safety of workers through a system of early detection applying artificial intelligence;
- Quality assessment by image processing technologies for verification of structure conditions and detection of cracks or material displacement, triggering additional inspections;
- Optimisation of equipment usage by advanced imaging and automatic tracking.

Expected impact:

- Better scheduling forecast by 20%;
- Proposals for a future European standardization for Digital Twins;
- Better allocation of resources and optimization of equipment usage;
- Reduced number of accidents on construction sites;
- Reduction of costs on construction projects by 20%.

TRL: 4-6

Type of Action: RIA

Budget: 5-6M€

Topic LC-EEB-07-2020: Smart Operation of Proactive Residential Buildings (IA)

Specific Challenge:

- Future energy management and contracting turning a building from reactivity into proactivity. A building should be able to control a situation rather than just responding to it;
- Interoperability between grid components and Building Energy Management Systems;
- Customer experiences should be simple, smooth and delightful.

Scope: Proposals should include at least :

- Develop, test and promote the necessary technologies, devices and systems for a smart approach of energy management in line with the revised EPBD;
- Develop solutions for proactive buildings, which should be safe, healthy (strengthening of the indoor environment quality) and energy-efficient;
- Develop solutions to provide the pivotal parameters to be measured and controlled for integrated and demand-based control of the building service system. Self-management, self-monitoring, self-healing and self-optimisation will be required;
- Utilising standardised approach to process the data generated by the sensors, forecasting services and end-users;
- Utilising big data to optimise the operation of the building;
- Ensure that fully integrated systems have the capacity to be compact, easy to commission and to operate, exchangeable and easy to interact with the grid;
- Implement and demonstrate new business models providing services that enable buildings to be proactive.

Expected impact:

- Maintenance cost reductions of at least 20%;
- Significant decrease of energy use in buildings through application of technologies such as dynamic models, big data analytics, predictive analytics and ultimately artificial intelligence;
- Improved indoor environment quality and user satisfaction;
- High replication potential;
- Optimise the use of renewable energy resources used in buildings;
- Contribution to standards, namely the establishment of a Smart Readiness Indicator.

TRL: 5-7

Type of Action: Innovation Action

Budget: 6-8M euros

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SMART AND CLEAN ENERGY FOR CONSUMERS
Energy Societal Challenge
Energy

Smart and clean energy for consumers (EC)

Deadline: January 2020

- EC-3-2020: Consumer engagement and demand response (IA) **29 January 2020 - INEA**
- EC-4-2020: Socio-economic research: non-energy impacts and behavioural insights on energy efficiency interventions (RIA) **15 January 2020- EASME**

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Challenge

Type of action: RIA (100%)
Opening: 16/7/19 - Deadline: 15/1/20

In the Energy Union Strategy, Energy Efficiency was recognised as a resource in its own right, which should compete on equal terms with generation capacity and have primary consideration across all policies. However, in order to create effective future policy scenarios and allow for financial and political decision making, the following should be considered:

- the real value beyond the fuel's cost and the (energy and non-energy) impacts of energy efficiency;
- psychological and contextual features (such as consumers' behavioural biases, superfluous complexity of alternative options or external barriers to energy efficiency) which can negatively impact the quality of consumers' decision-making

Scope a: modelling non energy impacts

Actions are required to make the value of the externalities triggered by EE investments more visible. The analysis should include positive and negative externalities relating to other policies (e.g. public health, air quality, etc.). Actions should build upon the existing methodological frameworks in order to:

- create models able to quantify and when possible monetise non-energy impacts of EE investments, taking into account e.g. rebound effect, double counting, etc.;
- provide a simplified and evidence-based tool which can help policy makers in defining optimised short-term cost-effective policies and measures as well as long-term strategies in the energy domain;
- disseminate the concept to households, businesses and financing institutions in order to increase awareness, information level, and investments in energy efficiency improvements.

Scope b: Behavioural insights for EE interventions

Actions should test EE behavioural change interventions through field trials informed by behavioural science. These trials should be aimed at selecting effective approaches to deliver the largest impact and should be targeted to specific energy behaviours. Research may involve a mix of methodologies.

Consortia should include behavioural experts and public authorities, DSOs and/or relevant organizations implementing energy efficiency related interventions.

The research should be relevant at EU level and allow to draw conclusions regarding the best policy instruments, the relevant contextual aspects determining the efficiency of the intervention and the long-term impacts of behaviourally informed policy interventions.

Proposals should build on relevant national and international projects and initiatives.

Impacts

- Support policies aiming to foster investments in EE improvements (scope a and b);
- Increased awareness (scope a and b);
- Number of stakeholders involved and reached out to, number of peer-reviewed articles produced, or references in policy documents (scope a and b);
- Increase awareness on multiple benefits among policy makers in other-than-energy policy departments (scope a);
- Number of analysed scenarios, EE measures and of non-energy benefits (scope a);
- Number of interventions designed (scope b);
- Number of consumers adopting a more sustainable energy behaviour (scope b);
- Primary energy savings triggered by the project (in GWh/year) & investments in sustainable energy triggered by the project (million Euro) (scope b).

Challenge

Type of action: IA (100%)
Opening: 3/9/19 - Deadline: 29/1/20

- Decentralised (renewable) energy production and digitalisation allow for new ways for consumers to engage in the energy transition, for example through energy cooperatives, peer-to-peer trading and citizen energy communities.

- Engaging consumers and prosumers in demand-response mechanisms and other energy services - based on dynamic prices as well as on incentives from grid operators to **adjust energy consumption or production** to help **maintain frequency** stability, **manage congestion** or address other grids constraints - has the potential to bring **benefits to consumers** and to the energy system.

Scope

- develop and test novel solutions and tools for demand response and energy services, using real consumption data to improve predictability of consumption and consumer behavior (aiming to create a digital twin of the consumer).
- main focus will be on households, other types of consumers not excluded
- demonstrate services that bring a fair share of benefits to consumers and to the energy system
- Proposals can:

- target one or multiple types of loads (e.g. appliances, electric vehicles, power to heat, etc.) as well as (small-scale) production (e.g. PV), include energy storage and one or several methods of aggregation (e.g. citizen energy communities).

- include energy vectors other than just electricity (e.g. heating, cooling, water, wastes, etc.) , and are encouraged to include other services than energy (e.g. mobility, health, etc.).

Scope

- also a perspective from consumers on the grid and the power system (SSH)
- privacy, consumer and personal data protection and cybersecurity should be addressed
- demonstrate interoperable digital communication solutions, make use of existing standards and contribute to open platforms and market places that can be integrated with other services based on platforms.
- cooperate with at least one of the projects supported under the topic LC-SC3-ES-5-2018-2020 that approach the challenge more from a grid perspective
- TRL will range between 5 and 8
- a contribution from the EU of between EUR 4 to 6 million

Impacts

- Increased use of demand response across the European energy system;
- Increased number and types of consumers engaged in demand-response;
- Demonstrated and improved viability of innovative energy services, best practices and effective incentives that can be replicated at large scale;
- Increased uptake of services that combine energy efficiency with other energy services, technologies and non-energy benefits;
- Increased predictability of consumption patterns and consumer behavior;
- Increased data protection and privacy for customers;
- Improved modelling of the flexibility levers from the new energy services;
- Increased share of energy to provide flexibility to the grid and increase the hosting capacity for RES.


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SMART CITIZEN-CENTRED ENERGY SYSTEM
Energy Societal Challenge
Energy

Registration open until: 12 June

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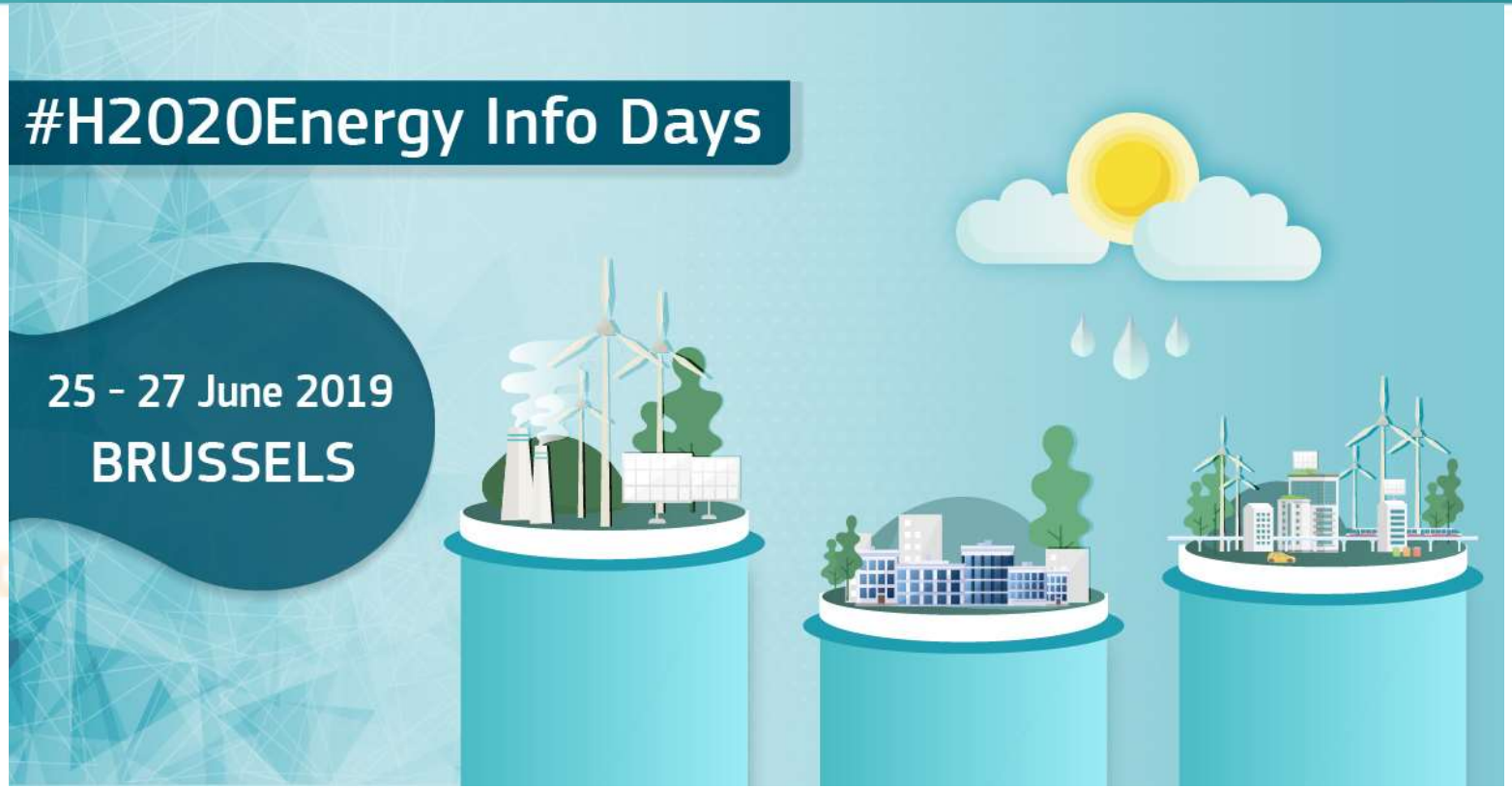

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