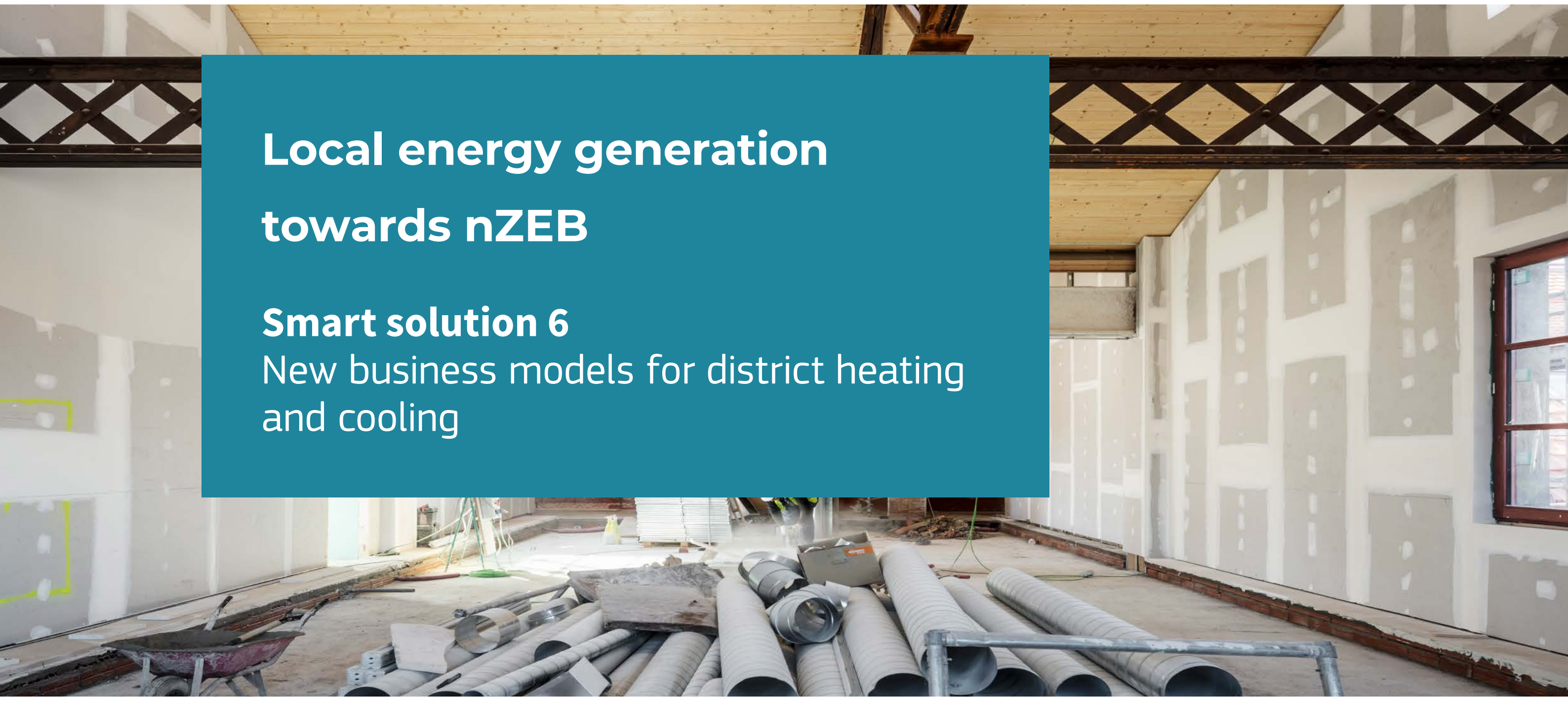

Local energy generation towards nZEB

Smart solution 6
New business models for district heating and cooling

Measured impacts

100% local thermal energy supply

20% of electricity covered by on-site photovoltaics.

84% reduction of CO_2 emissions by the heating system

Barcelona

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What is it?

Local energy generation towards nearly-zero energy building (nZEB) is about the connection of a public tertiary building to an energy-efficient District Heating and Cooling (DHC) network and the installation of local electricity generation through photovoltaics (PV). This is an important part of the technologies installed to reach a nearly-zero energy building (nZEB).

What did GrowSmarter do?

Barcelona Municipality has promoted the use of local energy in the design of the full retrofitting action for the innovation centre Ca l'Alier (*See factsheet 2: 'Energy efficient refurbishment..'*) in order to transform it into a nZEB.

A 68kWp photovoltaic plant was installed on the building rooftop. According to the Spanish Building Technical Code, Ca l'Alier does not meet the requirements for a compulsory installation of PV generation units.

However, according to Barcelona Municipal regulation for retrofitted tertiary buildings, Ca l'Alier must have PV generation units. Based on the building roof area, the minimum PV power to be installed was 16.5 kWp but the Municipality decided to install a much larger PV plant.

The retrofitted building is fed by heating and cooling energy from the local District Heating and Cooling (DHC) network of the district where it is located. This thermal network uses local resources. The existence of large waste heat sources in the urban environment represent an opportunity for the deployment of DHC infrastructure. The network distributes heating and cooling energy generated in a nearby plant based on: thermal energy recovery, incineration of municipal solid waste from the city, and use of sea water (for cooling) coupled to energy efficient equipment. The combination of technologies largely reduces fossil energy consumption.

A favorable local legislation is crucial for the massive roll-out of on-site RES and connection to DHC networks.

Lessons learnt

Even if nZEB criteria is applied in the building design and associated investment, once commissioned, it is essential to invest in operations and maintenance activities aimed at reaching the nZEB status and perform a thorough follow-up of the building's energy behaviour.

The installation of a large photovoltaic plant on the building rooftop demonstrates the possibility for conciliation between on-site renewable energy production and building heritage protection concerns.

Upscaling & replication potential

In mild climates, the DHC infrastructure is less spread than in cold climates. Notwithstanding, local regulation encourages the connection of large consumers (such as public tertiary buildings) to the existing networks, which fosters the potential for upscaling and replication of this measure.

How did the measure work?

Technical feasibility ●○○

The connection of the building to the local DHC network allows using the available local waste energy resources to supply the energy demand of the district, which is not possible for individual thermal systems. This helps to upgrade the energy rating of the building.

Economic feasibility ●●●

In moderate climates, the economic feasibility of the connection of a building to a DHC network is strongly dependent on the proximity of the building to the existing network(s), the building energy needs, and the planned expansion plans of the network.

Replication potential ●○○

The existence of large waste heat sources in the urban environment represents an opportunity to deploy DHC infrastructure, which (accompanied by favourable local regulation) ensures a replicable business case. The combination of local energy sources (i.e. DHC, PV) enabled the nZEB certification.

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