

# Chapter 40

## Energy Investment in Smart Cities Unlocking Financial Instruments in Europe

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### ABSTRACT

*The intense pressures being brought to bear by the increasing diversity in European urban development patterns call for innovative funding mechanisms to promote smart sustainable urban development, most notably in the energy sector. Currently in Europe, various policy initiatives support sustainable urban development through financial engineering mechanisms operating at municipal and regional scales. The objective of this chapter is to review the main financial mechanisms focusing on energy, and in particular on urban investments committed to a highly energy-efficient, and low carbon, economy. Within this framework we assert that, in order to achieve the EU sustainable urban development outcomes, specific European financial instruments will need to be considered as viable key investment options. The structure and operational features of European Financial Instruments are explored here in the case of the Urban Development Fund implemented in London. We also discuss the importance of ESCOs and crowdfunding as essential funding sources for community energy projects, and suggest that European policy should recognise their importance.*

### INTRODUCTION

The level of urbanisation in Europe at present is approximately 75%, and it is expected that, from 2020 onwards, Europe will stabilise at an urbanisation level of over 80%. Against this trend, a wide range of initiatives have been carried out in the EU context focussing on the pivotal role of cities and urban areas in addressing challenges associated with sustainable resource use and management of climate change

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impacts. However, due to continuing, and in some cases accelerating urban growth, cities are being forced to evolve in order to address the growing pressures on their infrastructures. One path within current urban development is that of the Smart City.

Smart Cities are key in the movement toward a more carbon-neutral economy because they foster the innovation necessary to invent and adapt technologies that help with resource management by reducing consumption (Caragliu et al., 2011; Manville et al., 2014). Part of their ‘smartness’ derives from the so-called spatial intelligence of cities, which arises from the combination of technology, agglomeration economics and individual and collective intelligence (Deakin & Allwinkle, 2007; Mitchell, 2007). But this new urban paradigm, which interweaves economics and environmental, cultural and social aspects with technological advances, still has hurdles to overcome, foremost of which are insufficient financial resources and appropriate business models. Smart City projects often have difficulty raising investment for their implementation because they tend to occur over long time frames and thus offer delayed returns on their investment; furthermore, such projects must often apply new and potentially unproven technologies. Furthermore, given that Smart City projects often involve interconnecting technologies, they are likely to face significant risk exposure in the form of operational and market risk. In our view, the formulation of new types of business models for attracting investment therefore still needs to take place.

Analysis of the financial resources and tools to support urban sustainable smart development is a paramount endeavour, particularly in light of the present economic slowdown, and also in emerging economies where banking and lending markets are still unfolding. Over the years, many financial tools have been designed to tackle the funding constraints within the public sector, and above all to attract private investors. However, such tools have frequently offered short time horizons for investments and a ‘silo view’ in relation to their financial returns. Whereas it is possible in Smart Cities to direct investments toward production, such as photovoltaic and thermal technologies, and consumption, such as the use of smart meters, but in both cases smart energy investments require the commitment of authorities, operators and citizens in the design and construction of effective services and infrastructures through integrated action.

Most greenhouse gas (GHG) emissions emanate from urban regions and therefore the response of city authorities to climate change and energy consumption is critical both to the achievement of climate and energy targets, and in the design and implementation of sustainable investment strategies. In particular, the increasingly popular use of Infrastructure and Energy funds for financing smart city projects is endorsed by scholars who agree that they are especially suited to support sustainable growth. Nonetheless, when we consider urban investment in smart energy, these financial tools have some limitations. For example, Infrastructure and Energy funds generally lack an integrated approach and thus do not cohere with city development strategies. Therefore, in recent years, major support and interest has been building with regard to financial instruments which can fill the gap in the market of funds dedicated to sustainable urban development. Within this framework, the objective of this chapter is to review the main financial mechanisms that have been designed to achieve highly energy-efficient, low carbon economies in cities.

We begin by investigating two main mechanisms, the first of which is well-established in the energy market, the Energy Service Companies (ESCOs); the second mechanism can be regarded as the new generation of investment funds: crowdfunding and community energy projects. Both types of tools can help to compensate for some of the shortfall in public investments directed towards smart energy projects. However, we argue that in order to achieve sustainable urban development outcomes, foster the development of Smart City technology, and invest in the transition to a low carbon and climate-resilient economy, the establishment of urban/regional funds for energy is a key investment option, especially when

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