Chapter 14
Climate Change Policies—Mitigation and Adaptation at the Local Level: The Case of the City of Madrid (Spain)

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ABSTRACT

Despite city level involvement in climate change policies since the 90’s existing understanding on how cities address climate change is still limited. Yet cities are key in dealing with climate change as they account for two thirds of global energy consumption, three fourths of CO2 emissions and their mitigation potential is significant. In order to advance current understanding on cities and climate change, semi-structured elite interviews were conducted. Data has been analysed using the Environmental Policy Integration (EPI) framework as a pre-requisite for sustainable development in Madrid, one of the EU cities expected to be significantly affected by climate change. The EPI theoretical framework has been used elsewhere in the literature for the analysis of other national and sectorial environmental issues and is applied in this chapter to the local level for the analysis of climate change policies. The research method is hence deductive in nature. The main findings indicate that progress has been made as regards mitigation. Adaptation is occurring spontaneously in sectors already experiencing impacts; however adaptation is poorly integrated into a comprehensive local climate policy.

INTRODUCTION

Cities cover 2% of the world’s land surface (Sacardini and Ferrari, 2010), they account for two thirds of global energy consumption, three fourths of CO2 emissions (IEA World Energy Outlook 2008; Ayuntamiento de Madrid, 2006) and have over half of the world’s population. In the EU alone urban population accounts for 69% of energy use (EEA, 2009). By 2025 more than 5,000 million people are expected to be living in urban areas. Cities also have great mitigation potential as two thirds of potential energy savings could come from cities (OECD, 2008). The analysis of energy man-
agement and climate change is hence inextricably linked to the local level (Musco, 2010) as local governments are one of the key institutions that can shape energy demand through their policies, public procurement decisions, etc. (OECD, 2009; OECD, 2008; Hunt & Watkiss, 2007).

In terms of impacts and vulnerability cities can be both exposed to and severely affected by flooding, extreme meteorological phenomena such as heat waves or cold spells and Urban Heat Island (UHI) effects. Cities can also be relatively more vulnerable to the effects of climate change than rural dwellings due to their dependence on large infrastructures such as waste management systems, public transport systems, water and communication systems (OECD, 2010). In addition to these impacts, it is important to note that the resilience of cities could be limited as large infrastructures tend to be ill-equipped to deal with extreme weather events (Hallegatte et al., 2010).

Examples of disruptions due to weather conditions are abundant. In the EU for example flooding in central Europe (such as those suffered in 2010), heat waves (that hit the EU, France in particular, in 2003) and cold spells (such as the one suffered in central Europe in 2010) have brought cities to a halt.

Countries and cities that are expected to be significantly affected by climate change are increasingly interested in policies to arrest it. Spain for example is the most semi-arid country in Western Europe and according to most climate model predictions is located in a climate change “hotspot”. Modelling predicts temperature increases per decade in Spain of 0.4°C in the winter and 0.6°C in the summer as well as reductions in precipitation of 5% per 1°C temperature increase (Moreno, 2005; Ayuntamiento de Madrid, 2008).

In particular, Spain’s capital city, Madrid, is expected to be severely affected by climate change. Madrid, is one of the great world metro regions and it is also the city that has experienced the highest increase in temperature amongst 16 European capitals between 1970 and 2005 (Valledaures, 2008). According to Ayuntamiento de Madrid (2008) predictions tell us that in Madrid we can expect to see temperature rises ranging from 4°C to 7°C in the summer (and between 2°C to 4°C in the winter) during the period 2070 to 2100 (compared to temperature records of the period 1960 to 1990). Additionally, Madrid’s policies to respond to climate change have only partially been analysed (Ryser and Franchini, 2009 and OECD, 2010).

As an illustration of how potential climate change can affect cities, Figure 1 shows a possible depiction of how EU urban populations, including Madrid, might feel (temperature wise) by the last quarter of this century in terms of the weather having moved south.

As regards precipitations in Madrid, models are less precise but maximum precipitation decreases are expected during the summer and high precipitation decreases are expected during the spring. Evapotranspiration is expected to decline between 40% and 60% during the summer, between 20% and 40% during the autumn and less than 20% during the spring. In winter an increase in evapotranspiration of less than 20% is also predicted.

As regards extreme weather events uncertainty is large, but, overall, frequent heat waves are expected. The predictions relative to cold spells are less precise (Ayuntamiento de Madrid, 2008). Downscaling General Circulation Models (GCM) could help produce climate scenarios at a resolution that is high enough to be used in impact models, analysis and policies.

Spain has undertaken studies on the impact of climate change on each of its river basins. The city and region of Madrid are located in the Tagus catchment, in the central Spanish plateau. Predictions anticipate a reduction in reservoir water inflow and available water resources of 7%, whilst demand for irrigation from 2027 to 2050 is expected to increase by 10%, thus adding pressure on diminished water resources. However, in an interview with senior officers at the river basin
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