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1.Introduction

Cities form the key context within which social, economic and environmental challenges for sustainable development will manifest in the years to come. As they face the grand societal challenges of climate change and the greening of energy systems, city governments are confronted with the challenge of designing and implementing workable policy strategies. A key question is how to design and implement effective policy strategies to govern the challenges of climate change in cities. In particular in relation to the various roles that cities play in governing the climate change challenges. In this short contribution, which is rooted in scientific literature, we summarize **roles** and key enabling **conditions** for workable climate change policy and –action.

2.Cities as key actors in the climate change challenge

In most countries climate change policies have been drafted and implemented [1, 2]. Attention to climate change in terms of policy and governance includes both adaptation (making cities more resilient to climate change) and mitigation (actions to avoid climate change from happening; for example by lowering greenhouse gas emissions) [2].

It is local governments that have a key role being nearest to citizens, and it is at the local level where climate change related problems manifest, and where climate change action is organized [4-7]. Moreover, in cities many greenhouse gases (GHG) are emitted, and cities are increasingly vulnerable to climate change. Examples concern heat waves, the urban heat island effect, declining air quality, hurricanes, increased precipitation, and flooding [2]. With predictions on further growth of cities in terms of inhabitants, economic activities and related consumption of energy and other resources, cities are of great importance in strategies to mitigate and adapt to climate change [8, 9], because it is also at the local level where many of the solutions could be developed and implemented and where local acceptability, accessibility and affordability of technology and other solutions are best assessed (e.g. smart grids, smart homes, system integration with smart mobility or other local public utilities, heat grids, local energy communities). Cities can take up various **roles**, and often this is a modest role among many incumbent stakeholders with vested interests:

- ‘champion’ [8],
- initiator of actions,
- first mover to adopt clean tech innovations [8],
- seedbed of innovation [10],
- policy implementing organization [11],
- regulator,
- facilitator,
- network manager,
- process—or project manager (cf. [12]).

3. Conditions that enable local climate action

Local governments need to design and implement workable climate policies that result in local climate actions (e.g., projects, infrastructure) that lower carbon emissions and make cities more resilient. Given the degree of urban and institutional complexity involved, this is more than—just another—governance challenge. It requires attention to both the nature of climate change related problems that might vary across jurisdictions, the politics of the policy making process, and the commitment and compliance by local parties who are involved in local climate policy implementation [9]. In a key publication Betsill and Bulkeley [16] listed five local conditions necessary to trigger substantial local climate action, viz. (i) the presence of a **committed individual** in a local-level government that (ii) manifests a solid **climate-protection policy** (preventing GHG emissions); (iii) has **funding** available; (iv) has **power** over related domains; and (v) perhaps most crucially, has the **political will** to act. If present these factors contribute to local climate capacity building, policy making and -implementation.

Following the signing of the Kyoto protocol many countries have embedded local capacity building in their national strategies. However, support by central government (via inter-governmental capacity building schemes) was of great importance in this process [11]. The latter [11, 17, 18] compliments factors addressed under the so-called 'localist' approach (focusing predominantly on local factors that contribute to local climate policy and related actions). It adds a 'multi-level' dimension in that it acknowledges the interplay of cities in climate actions with higher level governments—e.g., the EU, central government, regional government—but also to lower level in which relevant decision-making takes place—e.g., regarding district level infrastructural or housing projects.

The academic literature lists a comprehensive set of factors that influence local climate action, and can be seen as **enabling conditions** (See Table 1 on next page; [28]). It is argued that cities that meet these conditions are more than others capable of formulating effective climate change strategies that have a serious impact (either in lowering greenhouse gas emissions, in making the city more resilient to extreme weather events related to climate change, or in creating more 'climate co-benefits' like better energy supply or improved air quality).

One of the most important conditions mentioned in Table 1 is (local) climate change policy. Climate change policy can have many forms, and may deploy multiple policy instruments. They can have many forms, such as subsidies, levies, building regulations, awareness raising campaigns or even a multilateral agreement with other local actors. Closely related to climate change policy is the governing or governance style the local government uses. Kern and Bulkeley [20] discerned four **governing styles** used by local governments:

- governing by authority (using regulations and economic incentives to control other local actors);
- self-governing (enacting climate actions themselves; e.g., installing solar panels on the rooftop of the town hall);
- governing by provision (e.g., providing low carbon services to local citizens);
- governing by enabling (actions to empower local citizens and other local actors to undertake climate action themselves or build capacities to do so).

Table 1. Presentations of five key clusters on enabling conditions relative to local climate action

Cluster I: Municipal Organisation

Input

- Financial resources
- Fiscal health
- Legal authority
- Staff (expertise)
- Technology
- Size
- Council type

Throughput

- Political support (by council)
- Solid policy plan (clear goals and sound strategy)
- Commitment (by staff)
- Public leadership/presence of a local catalyst
- Inter-department coordination
- Knowledge management
- Monitoring and evaluation

Output

- Policy instruments
- Municipal governing mode (authority, self-governing, provision, enabling)

Cluster II: Characteristics of the Local Environment

- Demographic characteristics (SES, income, education)
- Environmental group activity
- Vulnerability to climate change
- Environmental stress
- Presence of carbon intensive industry
- Presence of energy infrastructure
- Available space for deployment of RES

Cluster III: The Local Action Arena

- Presence of process manager
- Support by local leaders
- Partnerships with private organisations

Cluster IV: External Issue Networks

- Collaborative ties with other local governments
- Involvement in/membership of climate change issue network(s)

Cluster V: Influence Exercised by Higher Government Levels

- Alignment with agendas of higher level governments
- Presence of inter-governmental support schemes

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