# Subnational climate networks, who they are and what they do.


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## Abstract


With about a year remaining until the 21st Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) in Paris, complementary climate governance initiatives including public actors such as networks of cities, regions and federal states have been increasingly vocal in demanding recognition and support for local climate action. These calls have been positively received and the importance of subnational authorities is increasingly being recognized by the COP. However, despite their proliferation and promises, the institutional architecture of subnational climate networks is not well understood. With a view to close this research gap, the paper aims to empirically assess networks of subnational authorities. Adopting a macro-perspective, we examined the three main assumptions underlying the positive view towards subnational climate networks: 1) they are global in nature, 2) they are ambitious in terms of mitigation efforts, and 3) they have a practical orientation. For this, we first analyzed the overall architecture of the networks, i.a. in terms of size, membership diversity and geographical representation. Building on the structural analysis, we addressed the substance of the networks' climate action by examining the framing and ambition level of mitigation commitments, making a clear distinction between commitments taken upon by networks and those set by individual subnational governments. On the practical orientation, we looked at implementation records and measurement, reporting and verification (MRV) procedures. Our analysis demystified some assumptions. We found that, 1) the networks' architecture is unbalanced, with an overrepresentation of members from developed countries 2) quantified mitigation targets, let alone ambitious ones, are largely the exception at network level, and 3) there is an implementation gap and MRV procedures are deficient. Overall, our analysis sheds a more critical light on the current problem-solving capacity of subnational climate networks.


**Keywords:** subnational governments; cities; regions; network; climate change; mitigation; commitment; ambition gap.

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# 1. Introduction

While the scientific understanding about climate change has substantially increased over the last twenty years, many claim that the political process carried out under the United Nations Framework Convention on Climate Change (UNFCCC) did not live up to expectations. Especially the failure to reach an agreement at the 15th Conference of the Parties (COP) in Copenhagen in 2009 raised concerns over the Convention's ability to tackle the problem adequately and fueled the debate about the appropriate forum and approach to climate change (Van Asselt et al., 2014; Hundorf, 2012; Eckersley, 2012; Bausch & Mehling, 2011; Bulkeley et al., 2012; Leal-Arcas, 2011; McGee, 2011; Falkner et al., 2010; Maltais, 2010; Rutqvist et al., 2010). Tacking stock of the apparent deadlock in negotiations within the UNFCCC, some actors initiated complementary initiatives leading to an increased fragmentation of the international climate change regime (Biermann et al., 2009). Abbott (2011) referred to this trend as a "*Cambrian explosion of international and transnational institutions, rules, implementation mechanisms, financing arrangements and operational programs*".

The general trend shifting from a 'target-and-timetable' approach to a more flexible system (Van Asselt et al., 2014; Karlson-Vihunzen & McGee, 2012; Bausch & Mehling, 2011) puts them high on the international agenda. With previous mitigation pledges from Parties well below what would be necessary to meet the 2°C-goal (Puig et al., 2013) and low expectations towards the forthcoming Intended Nationally Determined Contributions (INDC) (Bodansky & Diringer, 2014; Oberthür & Wyns, 2014), these complementary initiatives are thought to bear the potential to bridge the ambition gap. One example of these complementary initiatives are networks of cities, regions and federal states. In the last decade and especially since 2007, these networks have been increasingly vocal in demanding engagement of subnational governments in the global climate regime. Their calls have been positively received. In Cancun, the COP recognized subnational governments as a type of government stakeholder that needs to be engaged for effective climate action (UNFCCC, 2011).

However, despite the proliferation and promises of these initiatives, the institutional architecture of subnational climate networks is not well understood. In view of the policy relevance of the issue, we aimed to provide a better understanding of subnational climate networks and question the generic view that the networks go beyond what states do in terms of climate action. Based on an empirical assessment of the networks, we examined three assumptions underlying the positive perception of this type of network: 1) they are global in nature, 2) they are ambitious in terms of mitigation efforts, and 3) they have a practical orientation. Despite their prominence on the international scene, it appears that subnational climate networks present a certain number of weaknesses. From a structural, substantial and a procedural perspective they are subject to similar issues as the multilateral process; three specific issues being the dominant position of developed country members, the low ambition of current mitigation pledges and low MRV performances.

The outline of the paper is as follows: The second chapter will present a literature review on complementary climate governance initiatives and subnational climate action. Chapter three highlights the results of analysis. The first section will address the question of globality: adopting a macro-perspective, we analyzed the overall architecture of the networks, inter alia in terms of size, membership diversity and geographical representation. Building on the structural analysis, the second section addresses the substance of the networks' mitigation effort by examining the framing and ambition level of their commitments. A clear distinction is made between commitments taken upon by networks and those set by individual subnational governments. The third section is devoted to the practical orientation of the networks. It will highlight the extent to which mitigation commitments are implemented and what measurement, reporting and verification (MRV) procedures the networks put in place. The fourth chapter will draw conclusions.

## 2. Literature review

For Eckersley (2012) the UNFCCC is "*the most challenging international regime ever negotiated in terms of its complexity, the breadth and depth of change that is required*" and the challenges it faces are not surprising. Kehoane & Victor (2011) emphasize that climate change is a politically complex issue because of its global and intergenerational nature as well as the diverse interests and beliefs challenged by the different facets of the problem. This makes it "*difficult, if not impossible, for the legal regime established by the UNFCCC to govern climate change in clinical isolation*" (Van Asselt et al., 2014). The economic and political globalization significantly altered the traditional structure of international relations and, together with the increased participative capacity of non-state actors, floundered multilateralism (Happaerts et al., 2013; Andanova & Hofmann, 2012). The conventional top-down approach where sovereign state actors negotiate binding international commitments that shape national climate actions is challenged. Commonly raised issues in discussions about alternatives to the traditional multilateral process are procedural justice, legitimacy, transparency, accountability, efficiency, effectiveness and pace of negotiations (Eckersley, 2012; Karlson-Vihunzen & McGee, 2012; Hundorf, 2012; Moncelt & van Asselt, 2012; Tuerk et al., 2011). De facto, significant action is already being taken outside of the UNFCCC, examples are so called bottom-up initiatives or International Cooperative Initiatives (Widerberg & Pattberg, forthcoming). Considering the need for a rapid peak of emissions (Zang & Shi, 2013; Eckersley, 2012; Hare et al., 2012; Puig et al., 2013; Maltais, 2010) and the slow progress made under the Convention, these initiatives are likely to become important contributors to combatting global climate change.

Scholars agree that considerable work to address climate change is already being done at the subnational level and that their active integration, reinforcement and facilitation is an essential issue in the development of the future climate architecture (Bodansky & Diringer, 2014; Schroeder & Lovell, 2009). Ostrom (2009) stated that "*global solutions negotiated at a global level, if not backed up by a variety of efforts at national, regional, and local levels […] are not guaranteed to work well*".

The Agenda 21 already stressed the role of local governments for sustainable development (UNCED, 1992) and their involvement in global climate governance dates back to COP 1 where local government and municipal authorities (LGMA) were recognized as a constituency (UNFCCC, 2010). Over the last decade, and especially since the launch of the Local Government Climate Roadmap at COP 13 in 2007, subnational government networks have been increasingly vocal in demanding recognition and support for local climate action. Networks such as ICLEI Local Governments for Sustainability (ICLEI) or the C40 Cities Climate Leadership Group (C40) team up in different constellations to highlight the potential leverage of local mitigation action and advocate for the engagement of subnational governments in the global climate regime.

According to Bulkeley & Castan Broto (2012), over the last two decades they have been recognized as "*playing a significant role in responding to climate change*". Cities are considered to be laboratories of social change (Hoornweg et al., 2011) and centers of innovation for their counties and the global economy (De Scherbinin et al., 2007). Bulkeley & Castan Broto (2012) recall utopian ideals such as the garden city and highlight the experimental quality of cities. They see experimental projects as critical in creating niches and can ultimately challenge regime dominance (Bulkeley & Castan Broto, 2012). The diversity and practical nature of local projects makes them "*bound to bring forward genuinely new ideas and solutions that in the end can have an impact on a larger scale*" (Gustavsson et al., 2009).

Cities and climate change present a two-way relationship where the first are both part of the problem and the solution (Kamal-Chaoui & Roberts, 2009). Inter alia because of the important share of the world's population living in urban areas and the fact that municipalities have the authority over many emission intensive sectors (Betsill & Bukeley, 2004). OECD & IEA (2009) use the term *"Yes In My*

*Front Yard"* to highlight the willingness of many local governments to engage in climate friendly developments. Local governments can act in different ways: as consumer, facilitators, providers or regulators (Corfee-Morlot et al., 2009). The literature largely covers examples of subnational mitigation policies (Comodi et al., 2012; Betsill, 2011; Corfee-Morlot et al., 2009; Gustavsson et al., 2009; Flemming & Webster, 2004); these relate to various sectors and include, for example:

- Energy: combined heat and power schemes, renewable energy schemes, energy efficiency standards
- Transport: alternative transportation infrastructure (cycle paths and mass transit systems), alternative fuel vehicles for mass transit and municipal fleet
- Land use planning: support for alternative transportation infrastructure, reduction of commuting distances, traffic management
- Buildings: insulation and lighting standards
- Waste management: recycling, methane recovery
- Citizen outreach: education and training, provision of financial assistance, encouraged use of public transport and alternative transportation methods

Qi et al. (2008) developed a conceptual model explaining subnational climate engagement based on motivation (M), power (P) capacity (C), incentives (I) and constraints (C). Several empirical studies illustrated the importance of motivation (Betsill, 2001; Collier & Lofstedt, 1997). Bulkeley (2010) states that political leaders "*champion the issue, set agendas, and establish the basis for policy responses*". Their role is especially important at an early stage (Gustavsson et al., 2009).

The literature however also identifies a range of challenges and constraints for sub-national action (Azevedo et al., 2013; Bulkeley, 2010; Corfee-Morlot et al., 2009; Betsill, 2001). Azevedo et al. (2013) for example categorize them in simple market failures, institutional disincentives, and multi-agent problems. Betsill (2001) differentiates institutional, bureaucratic and budget barriers as well administrative and technical capacity issues. Often cited examples are:

- Lack of financial resources (competition over limited resources, need for short-term benefits)
- Lack of human resources
- Lack of expertise
- Institutional complexity and dispersed responsibility of climate related issues
- Unclear or incomplete jurisdictional power
- Divergence of interests between stakeholders.

Local climate action has recently become an active area of research (Hallegatte et al., 2011) and there are numerous case studies on mitigation action of individual subnational governments or specific campaigns run by networks (e.g. ICLEI's Cities for Climate Protection campaign). Much trust is put in the problem-solving capacity of subnational climate networks and an increased focus on them is perceptible in the media, which frequently features headlines such as "*cities bypass slow government to lead the way on climate change*" (Scott, 2013). The probably most prominent supporter of subnational governments, Benjamin Barber, argues to "*let cities, the most networked and interconnected of our political associations, defined above all by collaboration and pragmatism, by creativity and multicultural, do what states cannot*". He states that through local participation and global cooperation, we could achieve a "*miracle of civic 'glocality' promising pragmatism instead of politics, innovation rather than ideology and solutions in place of sovereignty*" (Barber, 2013).

Baber's position illustrates the leitmotiv of the praise of subnational climate action as going beyond what states do, be it in terms of cooperation, ambition or implementation. Although there

are numerous case studies on mitigation action of individual subnational governments or specific campaigns run by networks (e.g. ICLEI's Cities for Climate Protection campaign), the literature lacks an empirical assessment backing this claim. In our research we therefore aimed to address the three main assumptions on the networks' characteristics: 1) their global nature, 2) their ambition in terms of mitigation efforts, and 3) their practical orientation.

## 3. Analysis

As an initial step of the research, we identified subnational climate networks. While not aspiring for an all-encompassing review of existing initiatives, the aim was to provide an assessment of the area's landscape. The literature review provided initial input and we further complemented the list through a web-investigation. Striving for the greatest possible geographical inclusion, we used English, French, German and Spanish keywords on the search engine Google. We further refined the selection based on different criteria; the primary one being the presence of a functioning and recently updated website. Owing to the international and gap-bridging focus of the research, we further excluded single-country networks (e.g. the Regional Greenhouse Gas Initiative in the US) and those focused on adaption (e.g. the Asian Cities Climate Change Resilience Network or the recently launched Mayors Adapt). Finally, we excluded networks whose members are networks themselves (e.g. the United Cities and Local Governments). For the empirical analysis we finally selected the following 14 networks:

- Climate Alliance of European Cities with Indigenous Rainforest Peoples (Climate Alliance)
- Covenant of Mayors (CoM)
- ICLEI - Local Governments for Sustainability (ICLEI)
- EUROCITIES
- C40 Cities Climate Leadership Group (C40)
- Energy Cities
- Union of the Baltic Cities (UBC)
- Regions of Climate Action (R20)
- New England Governors and Eastern Canadian Premiers' Annual Conference (NEG/ECP)
- World Mayors Council on Climate Change (WMCCC)
- The Climate Group (States and Regions) (TCGSR)
- North America 2050 (NA2050)
- International Solar Cities Initiative (ISCI)
- Western Climate Initiative (WCI)

We further examined the networks' websites to gain background information; amongst other things we looked for the founding year, administrative host country and thematic focus.

Our analysis shows that most networks have been founded since the beginning of the 1990s, two exceptions can be highlighted: NEG/ECP, founded in 1973, and EUROCITIES, founded in 1986. Two dates seem to be pivotal in the creation of the networks: 1990 and especially 2005 (Table 1). The year 1990 was very prolific in terms of internal climate action; the IPCC published its First Assessment Report, national delegates met for the Bergen Conference on Sustainable Development and Second World Climate Conference, and, at the end of the year, the UNGA launched the start of negotiations for the Climate Change Convention (UNFCCC, 2014a). The spike in 2005 might in turn be linked to the entry in force of the Kyoto Protocol which marked a new stage in global climate governance.

Except one network headquartered in an Asian country, all the others are found to be administratively hosted by European (10) or North American (3) countries (Table 1). With three network headquarters located in the Belgian capital, Brussels stands out as a particular node in the network architecture. This particular position is very likely to be linked to the city's role as a decision making and lobbying center for the European Union.

We found a high variety in terms of thematic focus. Some networks address climate change among non-environmental matters such as youth, education or health. Others address climate change alongside other environmental issues such as sustainable development or biodiversity. Other types of networks were found to focus solely on climate change, have a narrower focus on mitigation or even focus on mitigation in a particular sector (Table 1).

*Table 1 Background information on the networks*

| | | |
|---|---|---|
| **Founding year** | Before 1990<br>NEG/ECP (1973), EUROCITIES (1986) | 2/14 |
| | In 1990<br>Climate Alliance, Energy Cities, ICLEI | 3/14 |
| | Between 1991 and 2004<br>UBC (1991), ISCI (2003) | 3/14 |
| | In 2005<br>C40, WMCCC, CGSR | 3/14 |
| | Since 2006<br>WCI (2007), CoM (2008), NA2050 (2009), R20 (2010) | 4/14 |
| **Host country** | Asia<br>South Korea: ISCI | 1/14 |
| | Europe<br>Belgium: CoM, EUROCITIES, Energy Cities<br>Germany: Climate Alliance, ICLEI, WMCCC<br>Poland: UBC<br>Switzerland: R20<br>UK: C40, CGSR | 10/14 |
| | North America<br>Canada: NEG/ECP<br>Canada/USA: NA2050<br>USA: WCI | 3/14 |
| **Thematic focus** | Environment among others<br>UBC, NEG/ECP, EUROCITIES | 3/14 |
| | Climate among others<br>ICLEI (sustainable development)<br>Climate Alliance (biodiversity and indigenous rights) | 2/14 |
| | Climate focused<br>WMCCC, R20, NA2050, CGSR | 4/14 |
| | Mitigation focused<br>WCI, CoM, C40 | 3/14 |
| | Focused on mitigation in one sector<br>Energy cities, ISCI | 1/14 |

## 3.1. The networks' global nature

Building on the initial background assessment of the networks, we addressed the assumption that subnational climate networks are global in nature. This assumption contributes to a positive view of the networks insofar as it suggests that they are effectively engaging in international cooperation, in opposition to nation states who struggle to find agreement in the multilateral process.

***Geographical distribution***

A striking feature of the often termed 'global' network of subnational governments engaged in climate action is the concentration of cities and regions to certain countries and areas of the world. To examine the location of the members of the networks in our study, the entire dataset of 6318 cities and regions has been geotagged and situated on a map. The result, featured in Figure 1 below, is a clear visualization of the large representation of cities and regions on the European continent, in Japan and Mexico, and along the east and west coasts of the United States. In the southern hemisphere, in particular Africa, South East Asia and Latin America, we observe a very sparse pattern of mainly large cities and capitals. In Russia, China, the Sahel, the Arab Peninsula and Sub-Saharan Africa, barely a single sub-national authority is represented in one of the investigated networks.

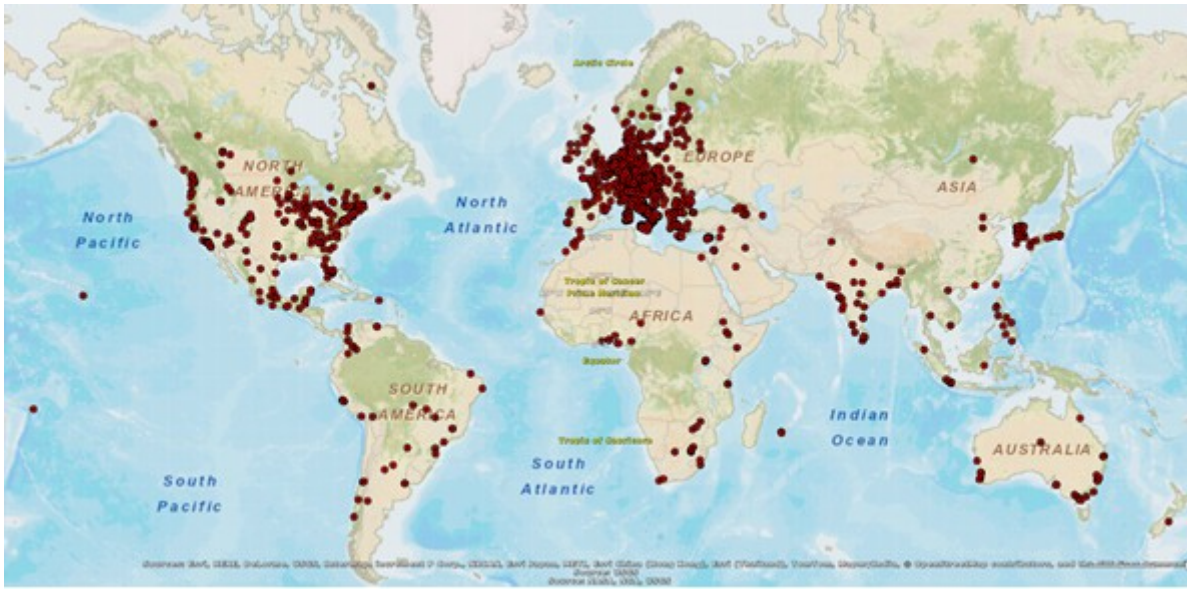


*Figure 1 Location of all cities and regions in the network*

The distribution of data-points on the map in Figure 1 suggests that the engagement of subnational governments in climate networks is not a global phenomenon but instead highly focused on the northern hemisphere in affluent countries with well-functioning governance structures. There is an under-representation of subnational governments from the global south as well as large authoritative regimes such as China and Russia.

***Connections and centrality***

To improve our understanding of the linkages within and between the networks, as well as trying to understand if some cities and regions are more active than others, we need to find ways to link the networks. One approach is to check to what extent the networks share members, i.e. are some cities part of more than one network, and if so, which ones are more active than others.

Figure 2 visualizes the structure of the 14 subnational networks. Interlinkages shows us how all members of the network are connected by shared members, meaning that all nodes are connected in the network formed where an edge is created when two subnational networks share at least one member. For example, if Barcelona is a part of both C40 and the Covenant of Mayors (CoM), then an edge is created. Not surprisingly, two sub-networks are formed according to the type of members, namely by regions (represented by pink squares in Figure 2) and cities (represented by

green circles). Only ICLEI features both cities and regions as members and has accordingly been assigned a "mixed" type (represented by a black triangle).

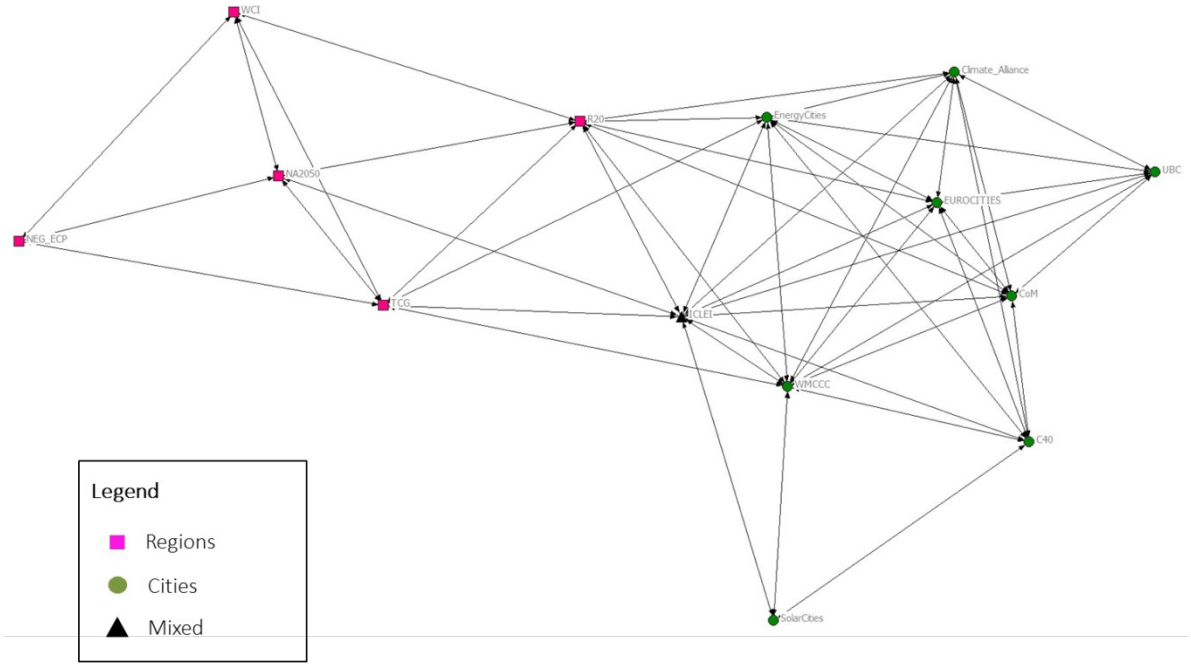


*Figure 2 one-mode network of linkages via shared memberships*

Probing the data further tells us that some networks are far more connected than others. Table 2 provides an overview of some of the most common statistics in network theory to assess centrality. Looking at the best connected node in terms of sharing members with many other networks is ICLEI, the WMCCC, R20 and EnergyCities which are two to three times better connected than the least scoring networks.

*Table 2 Descriptive centrality statistics for the one-mode membership network*

| ID | Degree | Closeness | Eigenvector | Betweenness |
|---|---|---|---|---|
| ICLEI | 12.000 | 15.000 | 0.370 | 136404762268066.000 |
| WMCCC | 11.000 | 16.000 | 0.355 | 681190490722656.000 |
| R20 | 10.000 | 17.000 | 0.307 | 101357135772705.000 |
| EnergyCities | 10.000 | 17.000 | 0.341 | 324523782730103.000 |
| Climate_Alliance | 9.000 | 19.000 | 0.318 | 0.700 |
| EUROCITIES | 9.000 | 19.000 | 0.318 | 0.700 |
| CoM | 9.000 | 19.000 | 0.318 | 0.700 |

| | | | | |
|---|---|---|---|---|
| TCG | 8.000 | 19.000 | 0.206 | 971428680419922.000 |
| C40 | 8.000 | 21.000 | 0.270 | 133333337306976.000 |
| UBC | 7.000 | 22.000 | 0.254 | 0.000 |
| NA2050 | 6.000 | 21.000 | 0.129 | 325714254379272.000 |
| WCI | 5.000 | 25.000 | 0.087 | 0.762 |
| SolarCities | 4.000 | 25.000 | 0.125 | 0.000 |
| NEG_ECP | 4.000 | 29.000 | 0.053 | 0.000 |

In table 2 we can also discern that the degree is somewhat correlated to number of members in the networks but does not provide the entire picture. The CoM for example, with almost 5300 members at the time of writing, only reaches an average degree of connectedness whereas R20 with 47 members, and EnergyCities with 152 members, both score above average. This observation could indicate that the networks share a number of key cities and regions that are much more connected than others. To test whether this is true, we examined the degree distribution of the nodes. The results show that of the 6319 nodes in the network, only 297 of them have a degree higher than 1 implying that only 4.7 per cent of the nodes are at least part of two networks or more.

To sum up, this section has shown that by applying simple measures of mapping and network analysis, the global network of cities and regions is shrinking and concentrating to the northern hemisphere and to a small sample of cities and regions being more connected then others.

## 3.2. The networks' mitigation ambition

In the second part of our analysis, we focused on the generic assumption that subnational climate networks are taking ambitious mitigation commitments. To check this assumption, we examined what type of commitment they issue and how they frame quantified targets. Building on this, we examined to what extent target setting at network level influences the members' mitigation commitments.

***Different types of commitments***

In relation to mitigation commitments, we identified three types of networks: 1) with qualitative mitigation commitments, 2) with quantified mitigation targets at member level, and 3) with quantified mitigation targets at network level. We found that most of the networks do not set quantified mitigation targets but merely issue political statements of intent on their commitment towards climate action. In this, subnational networks fit observations on other types of cooperative initiatives for which Hare et al. (2012) found that quantified targets were largely the exception. In the absence of quantified targets, their mitigation contribution rather consists in an indirect steering towards low-emission developments through activities such as lobbying or knowledge exchange.

*Table 3 Commitment types*

| | |
|---|---|
| Qualitative mitigation commitment | ICLEI, EUROCITIES, Energy Cities, UBC, R20, WMCCC, CGSR, NA2050 and ISCI |
| Quantified mitigation commitments at member level | C40 |
| Quantified mitigation commitments at network level | Climate Alliance, CoM, NEG/ECP and WCI |

We further focused on the framing of mitigation targets and found, that 1) targets are based on different metrics, 2) they are based on different timescales, and 3) they display varying levels of ambition.

***Different metrics***

Metrics are an essential element of target framing and there is a large body of literature on the merits and disadvantages of various metrics. Without entering the debate on the preferred use of one metric over the other, we highlight the importance of a common metric as a base for mutual understanding and comparison of mitigation targets. Our analysis showed the competing use of two metrics in subnational mitigation targets: absolute $CO_2$ reductions using base and target years, and per capita emission reductions. The CoM presents an interesting case of dissonance between theory and implementation: while the network's targets is set in absolute terms, we found that in practice 20.8% of the commitments are based on per capita emissions (CoM, 2014a).

***Different timescales***

As for metrics, using a single time scale, and especially using a specific base year, is essential to allow for a comparison between targets. For Annex-I Parties, 1990 is the default base year but there are exception to this (UNFCCC, 2014b). The use of different base years makes it difficult to compare the ambition level of mitigation targets. Late base years can be strategically used to put a veil on low reduction levels by making them appear in line with more ambitious targets. The use of harmonized target horizons is also important, as it puts mitigation efforts on a same path; thus paving the way for common periodic revisions. Currently, two target years dominate discussions: 2020 as the short-term

horizon and 2050 for the long-term. In addition, the EU recently agreed on a mid-term mitigation for 2030 (EU, 2014).

Our analysis showed, that the networks tend to replicate what can be observed at UNFCCC-level; that is the use of various time scales with a few elements, such as 1990, 2005, 2020 and 2050, standing out. The NEG/ECP and the CoM both frame their targets on the 1990-2020 timescale. For the later we however found, as for the issue of metrics, a significant difference between its stated target and the de facto implementation at member level. The network recommends using 1990 as a base year but adds that "*if the local authority does not have data to compile an inventory for 1990, then it should choose the closest year for which it can get the most comprehensive and reliable data*" (CoM, 2014b). In practice, only 1.9% of the members' targets are set against a 1990 baseline compared with 29.7% using 2005 and 17.5% using 2013. In the absence of a target at network level, only 45% of the targets set by C40 members use 1990. Of the Climate Alliance's three targets, only one sets a precise time scale, which is 1990-2030. Finally, the WCI is the only network deviating from the norm in terms of base year use. In line with the conditional target put forward by the US (UNFCCC, 2014b), the network sets its target against 2005[1].

***Different ambition levels***

Considering the high expectations towards the gap-bridging potential of subnational climate networks, a central part of our analysis was the examination of their ambition level. In the absence of a reference for what constitutes an appropriate or ambitious level of subnational mitigation targets, we use two points of reference. In line with the average of current mitigation pledges by Parties to the UNFCCC, our short-term reference is a 20% reduction by 2020 compared with 1990 levels (UNFCCC, 2014b; UNFCCC, 2004c). For long-term commitments we follow latest IPCCC recommendations, thus adopting the reference of a 72-103% compared with 1990 levels (IPCCC, 2014). Considering that only one network uses the per capita metric while also featuring a target in absolute terms, we focused on analyzing and comparing targets framed in absolute $CO_2$ reductions.

Beyond the fact that most networks don't set mitigation targets to begin with, we uncovered a mixed picture regarding the ambition level of existing targets as only two networks are in line with our point of reference (Figure 3).

We found both the NEG/ECP and the WCI to be of relatively low and very low ambition (Figure 3). The NEG/ECP aims to reduce its emissions by 10% compared to 1990 (NEG/ECP, 2001), putting it 10% below the reference point. The WCI agreed on a regional target of a 15% emission reduction by 2020 compared with 2005 levels (WCI, 2007). According the network's own estimates, this target however translates into a 2% increase of emissions when compared to 1990 levels (WCI, 2007). The network can therefore by no means be considered ambitious, especially considering factors such as historic emissions and level of economic development.

Regarding long-term mitigation action, both networks refer to IPCC recommendations. The NEG/ECP commits to "*reduce regional GHG emissions sufficiently to eliminate any dangerous threat to the climate*" (NEG/ECP, 2001) and the WCI members commit to "*do their share to reduce regional GHG emissions sufficient over the long term to significantly lower the risk of dangerous threats to the climate*" (WCI, 2007). Although the referencing of a quantitative range of emission reduction is a welcomed step, the targets are more qualitative in nature and leave ample room for interpretation on

1 To see how this affects the apparent ambition of the network's target, see Figure 6.

the level of reduction that will eventually be targeted. Based on the wording of their targets – e.g. the qualitative difference between eliminating and lowering the risk of a threat to the climate – we can furthermore expect that the NEG/ECP will prove more ambitious than the WCI.

The Climate Alliance and the CoM are in line with the reference level for short-term ambition (Figure 3). The Climate Alliance commits to continuously reduce greenhouse gas emissions with the aim "*to cut $CO_2$ emissions by 10 % every 5 years*" (Klimabuendnis, 2014a). This doesn't constitute a 2020 target per se but prescribes an emission reduction path. Considering the optimistic case in which members of the Alliance started cutting emissions in the planed proportions right after agreeing on the target in 2006, and considering that EU-27 emissions were 2.5% lower in 2006 than in 1990 (Olivier et al., 2013), this goal represents a 32,5% reduction of emissions by 2020 compared with 1990 levels. As such, it is well above our reference level. The CoM states that its signatories "*aim to meet and exceed the European Union 20% $CO_2$ reduction objective by 2020*" (CoM, 2014c), this corresponds exactly to our point of reference. We will address later how implementation levels influence the actual mitigation achieved by the networks.

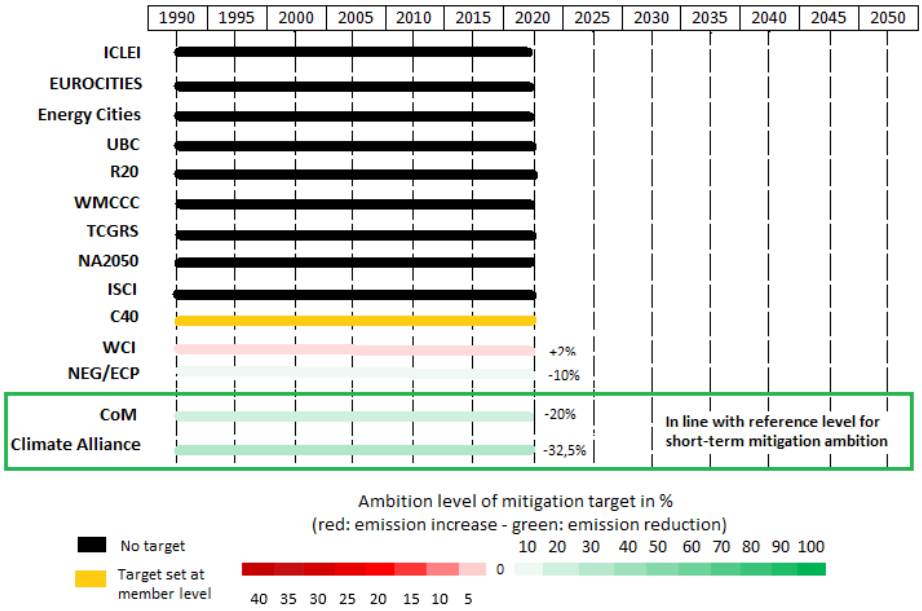


*Figure 3 Comparison of ambition levels*

### *Effect of target setting at network level*

In the previous part we demonstrated the heterogeneous nature of subnational mitigation commitments. Building on this, we examined to what extent target setting at network level can lead to more coherence in this domain. For this, we analyzed targets set by individual members of the C40, the NEG/ECP and the WCI. Because of the sheer number of members, we did not examine targets set by members of the Climate Alliance or the CoM. In the following we will highlight three aspects of the streamlining function of target setting at network level: 1) regarding the mere setting of individual targets, 2) the timescale used, and 3) the mitigation ambition.

A first result of the analysis is that target setting at network level tends to lead to target setting at member level. In the absence of a target at network level, between 40.6% and 53.6% of

C40 members do not have a reported mitigation target[2]. In comparison, all the WCI members (Figure 6) and all except one NEG/ECP members (Figure 7) have individual targets.

The second result of our analysis is that target setting at network level tends to lead to harmonized time scales for member targets. Aside a certain prominence of 1990 and 2020 as base and target years, we found no clear pattern to the C40 members' commitments in terms of time scales (Figure 4). Targets set by members of networks featuring quantitative targets on the other hand display a high level of coherence. All WCI members conformed to the network's time scale of 2005-2020. For the NEG/ECP, except one member issuing a long-term commitment, all feature targets on the network's time scale of 1990-2020.

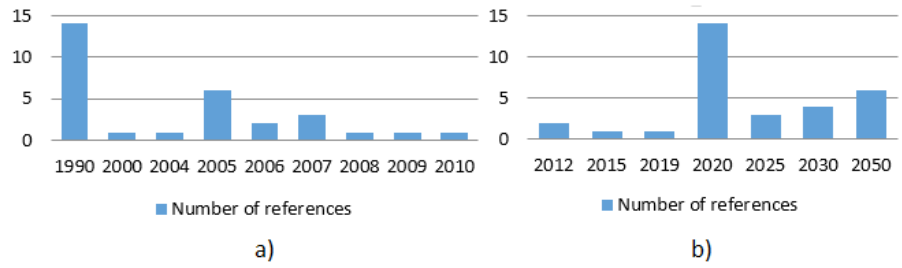


*Figure 4 Base (a) and target (b) year use in C40 member targets*

Our third and last point concerns the ambition level. Contrary to the two previous points, our analysis showed a mixed picture on this issue. For the C40 we found that, in addition to using a broad range of base and target years, members aim for various reduction levels. Although the different time scales make comparison difficult, some members display low levels of ambition while others set remarkably ambitious targets (Figure 5).

2 Of the 69 members, 32 have and 28 don't have a target; for 9 members the situation is unclear as the commitment is incompletely reported on the website, e.g. lacking a target or base year (C40, 2014a).

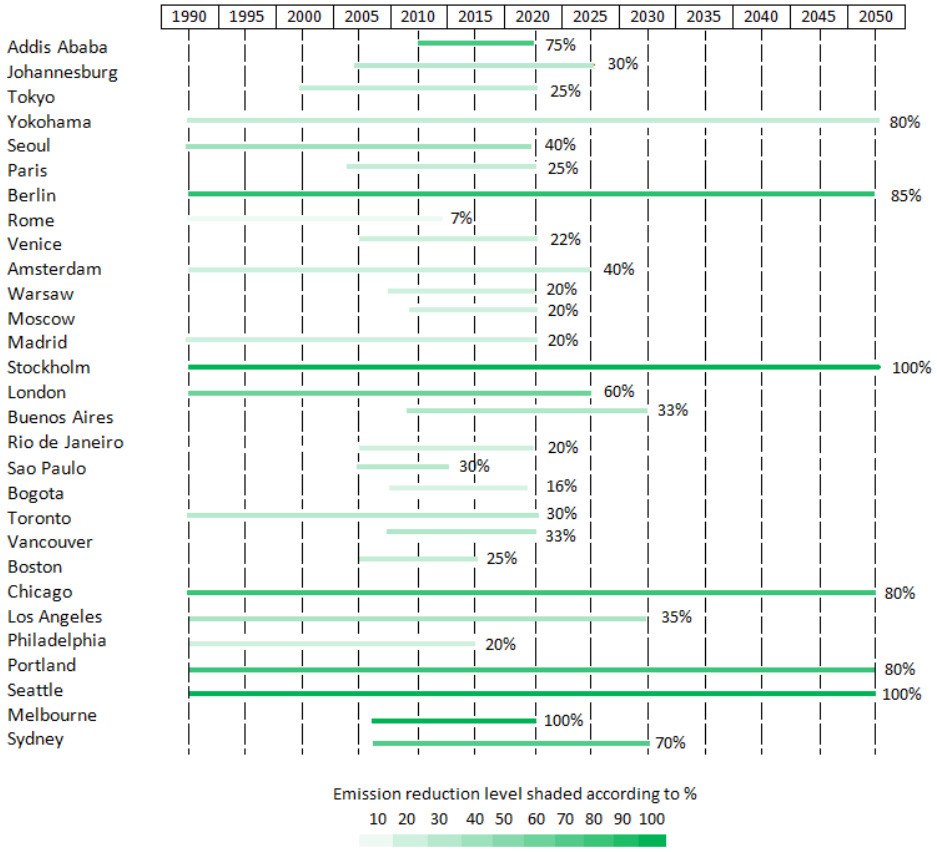


*Figure 5 C40 member commitments (excluding members without targets)*
Data source: C40 (2014a)

The same assessment applies for the WCI. WCI members set their target unilaterally and with highly varying levels of ambition (Figure 6), as can be highlighted by Arizona's individual target corresponding to a 35% increase in emissions compared to 1990 levels while Oregon commits to a 10% reduction on the same time scale (WCI, 2007). Although WCI members form a network featuring a quantified target, it consists in a mere aggregation of individual member targets. As the cooperation is not based on a shared vision for mitigation ambition, this type of network does not exert a streamlining function regarding the ambition level of member's targets.

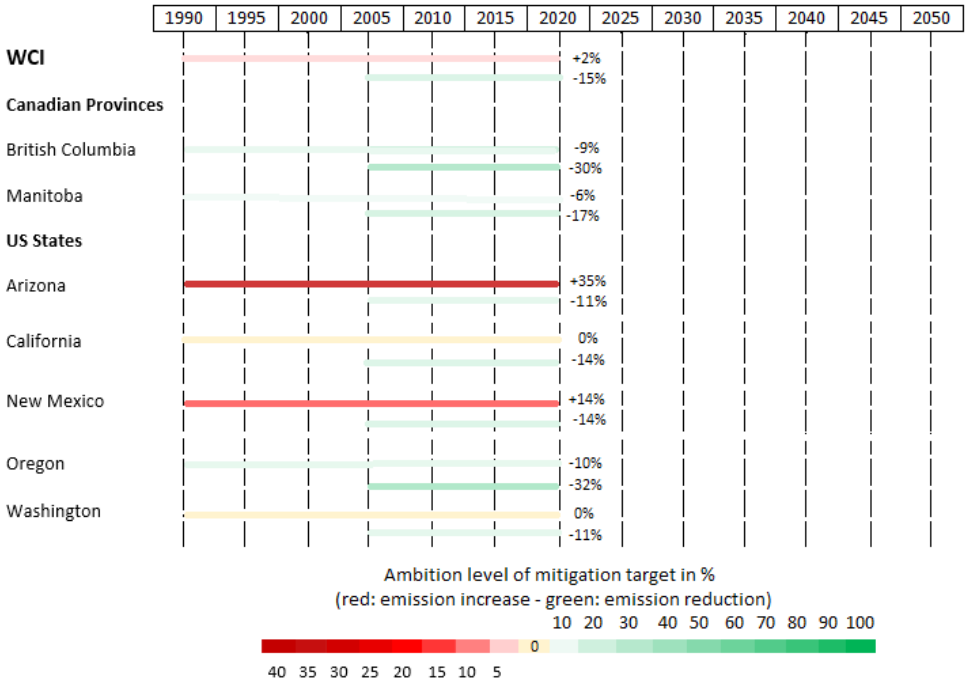


*Figure 6 WCI member commitments set against 1990 and 2005 levels*

The NEG/ECP appears to be the exact opposite. Target setting at network level appears to be the fruit of negotiations based on a shared vision for mitigation ambition and predates individual targets. In their climate action plans, the network's members consistently refer to the target set by the NEG/ECP and most of them transposed it as such at local level. Even the one member that didn't set an individual mitigation target states it contributes to the target established by the network (PE, 2014).

The downside to this streamlining effects seems to be that members don't tend to set more ambitious targets than that set at network level. Of the NEG/ECP members, only two went beyond its 10% reduction target (Figure 7). Similarly, our examination of the CoM's members' targets showed that 32% of them don't exceed the network's minimum requirement of a 20% emission reduction and that members tend to aim for reductions in the lower ambition range (Fehler: Referenz nicht gefunden).

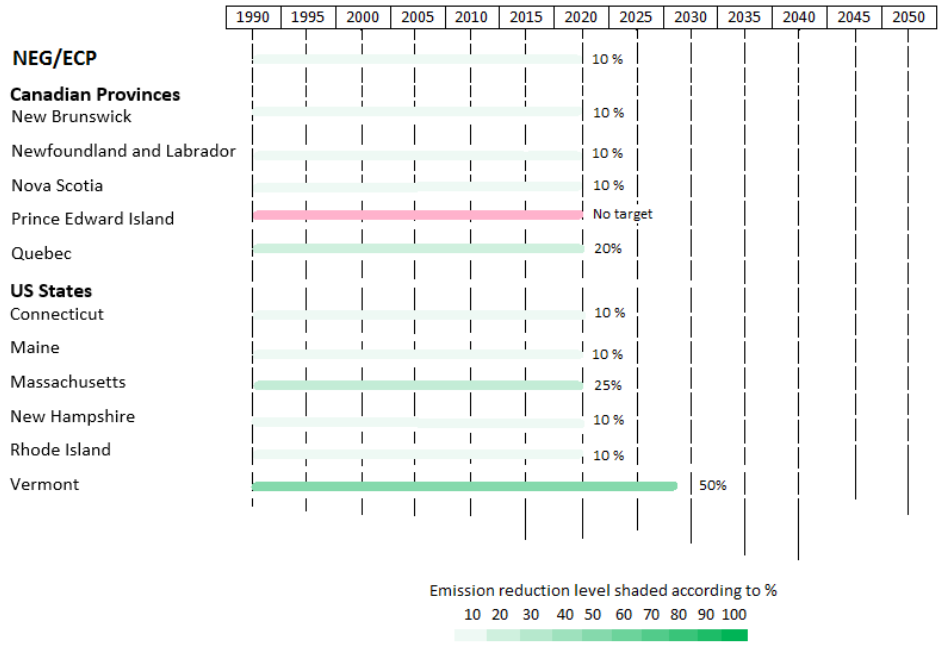


*Figure 7 NEG/ECP member commitments*

To sum up, this part of the analysis demonstrates that while the majority of the networks contributes rather indirectly to emission reductions, only a minority of them bears the potential for a direct contribution to bridge the 2°C-gap. Of the 14 examined networks, only 4 were found to set a quantified mitigation target. The latter are framed around different metrics, timescales and ambition levels. We can rank them according to their ambition level and found that, at best, two of them are in line with current mitigation pledges put forward by Parties to the UNFCCC. We also found that, insofar that it is not a mere aggregation of unilaterally defined targets, target setting at network level exerts a streamlining effect on member commitments. Both in terms of coherence and ambition, we argue that the current mitigation action of subnational climate networks stands in harsh contrast to the trust put in their problem-solving and gap-bridging capacity.

## 3.3. The networks' practical orientation

In the third part of the analysis we addressed the assumption that the networks are more practical in nature, more focused on the actual implementation of measures compared to nation states. We looked at the extent to which network members implement their commitments and what MRV mechanisms the networks put in place to increase the transparency and accountability of their action. In the following we will highlight four interlinked results: 1) the type and quality of the reporting is highly variable, both within and across networks, 2) thus, no clear assessment can be made of the level of implementation at member level, 3) therefore, the current gap-bridging capacity of subnational networks is likely to be lower than what could be expected from their stated targets, and 4) recent years showed an increased focus of some networks on MRV.

While information, communication and recognition are elementary aspects of the networks' activities, we found that they perform rather low on them when it relates to reporting on members'

implementation records. On this, we identified three types of networks: 1) without reporting commitments, 2) with commitments towards internal reporting, and 3) with commitments towards publicly available reporting (Table 4). These categories are intrinsically linked to the presence or not of quantified mitigation targets.

*Table 4 Type of MRV commitments*

| | |
|---|---|
| Without reporting commitments | ICLEI, EUROCITIES, Energy Cities, UBC, R20, WMCCC, CGSR, NA2050, ISCI and C40 |
| With commitments towards internal reporting | NEG/ECP and WCI |
| With commitments towards public reporting | Climate Alliance, CoM, |

The first type of network is a heterogeneous group; some don't report about any member activity (e.g. the WMCCC) while others highlight mitigation actions by individual members (e.g. Energy Cities). We situate the C40 at the periphery of this group as it presents information on its members in a systematic manner, sometimes with great detail on targets, current emissions and emissions compositions (C40, 2014a). When it comes to assessing the quality of the members' reporting, their implementation record, and thus the networks' gap-bridging potential, the accessibility of the reporting is essential. Claims by networks of the second type, such as "*the WCI agreement is consistent with previous well-designed cap-and-trade programs that have had compliance rates of over 99 percent*" (WCI, 2013) or "*the NEG/ECP confirms that it has surpassed its 2010 greenhouse gas (GHG) emission reduction target of reducing the emissions to 1990 levels in 2010; and the region is already almost a quarter of the way toward its 2020 goal*" (NEG/ECP, 2013) are of limited use. From this perspective, only the third type is of interest.

Both the Climate Alliance and the CoM define monitoring and reporting rules (CoM, 2014d; Klimabuednis, 2011a & 2001). Their members commit to prepare and submit reports with the "*aim to check the compliance of the interim results with the foreseen objectives in terms of measures implemented and $CO_2$ emission reductions*" (CoM, 2014d). At present, we found that the quality of the reporting is highly variable, going from no over basic information to detailed progress reports. Although the members commit to publically report about their emissions and mitigation action, in practice they don't comply with it. Therefore, even for the third type of network, no conclusions can be drawn regarding implementation of mitigation commitments.

This in turn opens up the question, whether the lack of compliance with reporting commitments is due to a lack of capacity or a lack of implementation. It seems likely that both aspects interplay. With view to the probable gap in implementation of mitigation action at member level, the emission reductions achieved by the networks are likely to be lower than their stated targets. As such, the CoM will likely not achieve a collective 20% reduction of emissions by 2020 compared with 1990 levels and the Climate Alliance is likely not reducing its emissions by 10% every five years.

On the positive side, we found that networks are taking upon the issue and demonstrate an apparent willingness to address the lack of implementation and MRV. The Climate Alliance for example launched an initiative to assist its members in initiating and monitoring their local climate change action programs through the development of inventories, indicators and the collection of emission data (Klimabuendnis, 2011b). Beyond capacity building actions, the CoM is strengthening its compliance mechanism. According to the network's own estimates, in 2013 about 10% of the members did not comply with their reporting commitments (CoM, 2014e). While opening the possibility for members to request a deadline extension, the network features a termination –else suspension- procedure in case of compliance failure (CoM, 2014f) and appears to have tightened its application with view to the relatively high number of cases. Examining the network's website we found several examples of suspension, e.g. for Gaza or San Nicola Manfredi (CoM, 2014g). The CoM furthermore intends to launch a monitoring catalogue (CoM, 2013). Similarly to its search tool that

allows for a quick evaluation of the members' ambition level, this could foster competition and lead to better MRV and implementation records. Since the extended deadline for the launch of this tool has already passed in 2013, it however is unclear when it will be available.

Interestingly enough, we found that beyond networks with commitments towards publically available reports, some without reporting commitments have been very active in this area. In 2010, the C40 for example entered in a partnership with the CDP (former Carbon Disclosure Project) with view to make it the "*preferred reporting platform*" (C40, 2011) for its members. This collaboration highlighted, that "*cities employ a wide variety of methodologies in calculating greenhouse gas emissions*" (C40, 2014b). The absence of harmonized GHG inventory and monitoring methods is an issue often raised in the literature on subnational mitigation action (Hoornweg et al., 2011; Corfee-Morlot et al., 2009; Kamal-Chaoui & Roberts, 2009; Lefevre & Wemaere, 2009; Kern & Alber, 2008; Satterthwaite, 2008; Flemming & Webber, 2004; Kousky & Schneider, 2003). Differences inter alia relate to:

- The inclusion or not of certain sectors
- The establishment of geographic boundaries
- The choice of inventory years
- The scope of the inventory
- The aggregation of data.

Our analysis showed that ICLEI plays a pivotal role in addressing this issue, especially through two lines of work: the development of 1) a comprehensive GHG accounting protocol, and 2) a transparent reporting mechanism.

After the launch in 2009 of ICLEI's International Local Government GHG Emissions Analysis Protocol (IEAP), the major step on the first line of work happened in 2011 when ICLEI and the C40 teamed up to develop a Global Protocol for Community-scale Greenhouse Gas Emissions (GPC). In developing the GPC, they built on existing protocols and standards, including inventory guidelines established by the CoM (Arikan et al., 2012). The GPC is a promising tool in that it addresses several issues mentioned above, e.g. sector, boundary and aggregation issues (ICLEI, 2014). After the launch of a pilot version in 2012, the final version is expected to be released at the end of 2014 (GHGP, 2014). The extent to which the GPC will contribute to greater coherence in subnational climate action will depend on its uptake by the according government officials.

On reporting, the key initiative appears to be the development of the carbon*n* Cities Climate Registry (cCCR) which is understood as the "*local response to Measurable, Reportable, Verifiable global climate action*" (Arikan et al., 2011). The cCCR was launched in 2010 and is backed by several actors beyond ICLEI, including two networks examined in this paper: the WMCCC and R20 (cCCR, 2014a). While initially following IEAP guidelines for emission inventories, the cCCR will be using the GPC once it is finalized (Arikan et al., 2011). In this, the cCCR increases the profile of the GPC and contributes to strengthen the harmonization of subnational MRV of climate action. Since its launch, the number of cities reporting to the cCCR and those reporting mitigation targets has been increasing (Moncuit, 2014). An interesting development within the cCCR relates to the collaboration between ICLEI and the R20 on the vertical integration of emission reporting. In addition to addressing the issue of double-counting between cities and states or provinces, we see it as bearing significant potential to further link subnational mitigation action to the national level. Acknowledging the progress made in terms of measurement and reporting it is however important to highlight that the cCCR is so far deprived of a verification process (cCCR, 2014b) which is a crucial element on the way towards an institutionalization of subnational climate action in the climate change regime.

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# 4. Conclusions and recommendations

In the context of discussions about the future architecture of the climate change regime and the growing importance of complementary governance mechanisms we aimed in this paper to provide a better understanding of subnational climate networks in terms of structure, substance and procedures. In line with an assessment by Bodansky & Diringer (2014), we found that a "*considerable amount [of work] is already being done on the ground to address climate change, at the national and sub-national levels and by private actors*". Our analysis showed that it is an active area of research and that individual government officials, networks and the media echo praise and trust in the problem-solving capacity of subnational government networks.

We empirically addressed three main assumptions on the networks' characteristics: 1) their global nature, 2) their ambition in terms of mitigation efforts, and 3) their practical orientation. Contrary to the generic positive view that the networks do better than nation states and the traditional multilateral process, we uncovered some critical issues. In terms of structure we argue there are two main deficiencies: 1) a limited set of subnational authorities, cities and organizations occupies a central position in the overall architecture, and 2) the representation is skewed towards a dominance of members from the northern hemisphere while some regions are absent in the networks. Regarding the substance of their commitments, we found that, 1) most networks don't set quantified mitigation targets, 2) existing targets use different metrics, timescales and are of varying ambition, with a tendency towards low ambition, and 3) if a target at network level is more than a mere aggregation of unilaterally defined targets, it tends to streamline member targets regarding their framing and ambition level. On implementation and MRV we finally found that, 1) the type and quality of the reporting is highly variable, both within and across networks, 2) no clear assessment can be made of the level of implementation at member level, 3) therefore, the current gap-bridging potential of subnational networks is likely to be lower than what could be expected from their stated targets, and 4) recent years showed positive developments on MRV.

Overall we found, that subnational climate networks bear a lot of potential, but that they currently don't live up to expectations on globality, ambition and practicality. In many aspects they are subject to the same hurdles as the multilateral process. One key aspect in which they already positively feed into the process is that it gives room for another type of international cooperation between developed and developing countries. Although the targets set by the WCI and the NEG/ECP are not striking by their ambition level, mitigation action in North American states must certainly be welcomed, be it only for its model character and trust building effect. Similarly, subnational governments from developing countries have been found to set quantified targets and therefore take a step back from the classical outlaying of common but differentiated responsibilities. One example is the Ethiopian city Addis Ababa which, according to the C40, commits to reduce its emissions by 75% by 2020 compared with 2010 (C40, 2014c).

Regarding future developments, we identify different elements worth some observation. For one, it will be interesting to see how the CoM is going to respond to the EU's new target of at least 40% reduction by 2030 compared with 1990 levels (EU, 2014). In addition, the decision on a mid-term target for the NEG/ECP could bring the network on a more ambitious track, negotiations are scheduled to end in August 2015 (QC, 2014). Finally, a recent highlight was the launch at Ban Ki-moon's Climate Summit in September 2014 of two new initiatives, the Compact of Mayors and the Compact of States and Regions. Both are intended to serve as umbrella organizations for different networks and issued commitments towards emission reduction targets and measurement and reporting. However, in addition to the fact that they don't set quantitative targets themselves and omit the issue of verification, it is important to highlight a significant difference between the two: while under the Compact of Mayors reporting has to comply with GPC standards and make use of the

cCCR, the Compact of States and Regions "*will not endeavor to create a common methodology for collecting and reporting this data*" (UN, 2014). Finally, it is regrettable, that instead of a single agreement for all types of subnational governments, there is a continued fragmentation between cities on the one hand and states and regions on the other. In theory, we see a great deal of potential for an umbrella agreement for subnational governments. In their current form, the two initiatives however represent only a first step towards a more coherent and transparent approach to subnational climate action.

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