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Local Entities as Mechanisms for Global Climate Governance

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Introduction

Climate change as a result of anthropogenic greenhouse gas emissions is one of the most immediate threats the world currently faces. As Levin et al. notes, climate change is a "super-wicked problem" as time to deal with it is running out, the authority tasked with solving the issue and enforcing that solution is weak, the same actors are both responsible for causing the problem and finding a solution, and actors are discounting the future irrationally. There are a multitude of difficulties in effectively addressing an issue as complex as climate change, but one of the most pressing is turning agreements on an international level into action on a local level. Traditionally, agreements aiming to decrease the release of greenhouse gases have been reached through conferences with leaders of sovereign nations. It has then been the prerogative of each country to enact change how they see fit, including delegating the necessary actions to local communities to attempt to meet those goals. However, we believe an alternative framework for addressing the issue of greenhouse gas mitigation may be more successful, one that begins with deep local agreements and works to gradually incorporate additional communities. The question we set out to answer is thus, what is the role of local environmental governance in managing long-term global environmental challenges?

The idea of effective "long-term global" environmental governance runs into difficulty in the modern world, where local and national sovereignty are strongly supported and domestic political challenges emerge from a locally-focused voter mindset that can change quickly over time. With this in mind, we argue that both policy and action must begin locally and remain permanently.

Past solutions on the local, state and small nation level can be improved, and considering expected increases in future urbanization, agreements within transnational municipal networks are a workable solution to greenhouse gas mitigation and may have more potential than the conference of parties that have taken place in the past. We recommend that future global climate conferences center around these networks, organized around groups of cities establishing multiple subnetworks based on the ambition of their climate goals. We additionally propose a theoretical transnational municipal/regional network to bind these cities together.

In this paper, we consider global environmental challenges to be the problem of anthropogenic climate change. We define local action to be any regulation or agreement concerning greenhouse gas mitigation taken on a town, city, state, or provincial level. Urban areas vary dramatically in size and density but can be considered in this paper as any metropolitan area with a population over half a million people. Transnational municipal networks (TMNs) are agreements and solutions enacted on a local level in accordance with other cities. These have taken many forms in the past, including the C40 Cities Climate Leadership Group, the Covenant of Mayors, and the Cities for Climate Protection program. In a similar vein, transnational regional networks are enacted amongst regions, states, and provinces.

There is a difference between 'government' and 'governance,' with the former focused on states and the latter on a "global scale through both the coordination of states and...an array of rule systems that exercise authority in the pursuit of goals and that function outside normal national jurisdictions."[1] There are many forms of transnational governance that "explicitly seek to address environmental issues through constituting new forms of transnational relations."[2] There is a difference between "transnational networks that influence the creation and operation of governance institutions but are not recognized as authoritative (as in the case of non-state actors involved in multilateral negotiations) and those that govern in the sense of bringing together a sufficient marriage of power and legitimacy to establish, apply, [and] enforce rules." The goal for our proposed TMN is to do both. "Transnational governance can be distinguished from other forms of transnational relations because of a focus on public goals, an intention to steer or direct the behavior of members or a broader community, and their authoritative position."[3]

Past attempts to increase greenhouse gas mitigation efforts have relied on global agreements between nation-states, which have largely failed to reduce the rampant growth of greenhouse gas emissions. There are a multitude of reasons for this. Global climate change negotiations produce a tri-part challenge, with difficulties in balancing stringent commitments, widespread participation, and effective enforcement[4]. In the past, we have seen climate

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[1] Bulkeley, H., Andonova, L., et al. (2012a). Governing climate change transnationally: Assessing evidence from a database of sixty initiatives. *Environment and Planning: Government and Policy, 30, 591.*

[2] Ibid.

[3] Ibid.

[4] Hovi, Jon, Detlef F. Sprinz, and Arild Underdal. 2009. "Implementing Long-Term Climate Policy: Time Inconsistency, Domestic Politics, International Anarchy." *Global Environmental Politics* no. 9 (3):20-39. doi: doi:10.1162/glep.2009.9.3.20.

negotiations fail on all three fronts. Few negotiations have been met with the pledges on the scope that is needed to prevent dangerous effects, and until the Paris accords, participation was very limited to a few developed countries, and there has been no effective form of enforcement that has been seen on the global level in any of the past world agreements.

Historical Context

Considering all action under these agreements is ultimately local, it is helpful to explore the history of climate negotiations to see that global environmental agreements have not driven concrete local action. Aside from some exceptions, the community response on a worldwide level has been very tepid. Mitigation projects have been successful on a very local level, but most multinational schemes have been failures when instituted from the top. Take the Kyoto Protocol, one of the more significant agreements to date, which was ratified in 38 industrialized countries. The agreement by and large has not been successful in meeting goals it pledged, partly because action was not trusted on a local level. For example, it included a number of flexibility mechanisms to allow countries to buy and sell carbon credits to meet their pledged goals. In theory, this system would minimize the cost of abating carbon amongst all of the signatories. In practice however, the system only worked within the European Union, with all of the emissions trading taking place under EU Emissions Trading Schemes and none between intercontinental governments. Even after establishing an agreement, countries lacked the political enthusiasm on the domestic scale to follow through with their commitments on the international level.

Furthermore, even when implemented in Europe, the EU Emissions Trading Scheme has caused little to any noticeable decrease in emissions since it was enacted in 2005[5]. Instead, the scheme has been characterized by carbon caps that are too lenient and general distrust in the system. There are currently efforts underway to improve the system past incentives have been so weak that many companies do not see reason to be compliant. In fact, UBS estimated that by 2011, Europe had spent $210 billion dollars on the EU ETS and had almost no reductions in carbon dioxide emissions to show for it[6].

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[5] Ellerman, A, Marcantoniniy, C, & Zaklanz, A 2016, 'The European Union Emissions Trading System: Ten Years and Counting', Review Of Environmental Economics & Policy, 10, 1, pp. 89-107, Environment Complete, EBSCOhost, viewed 16 December 2017.

[6] Maher, Sid. “Europe's $287bn Carbon 'Waste': UBS Report.” National Affairs, The Australian, 23 Nov. 2011.

Considering these failures, alternative methods of negotiating and establishing climate regimes must be considered. As Ostrom notes in A Polycentric Approach for Coping with Climate Change, "Relying on one scale to solve the problem of climate change is naïve."[7] Thus, we believe that tackling the problem of climate change through an expanded network of cities will be more fruitful in the future than through negotiations between nation-states

Why focus on cities?

There are a number of reasons to concentrate climate effort on cities, including demographic trends, economies of scale, and political feasibility. For one, the concentration of emissions around urban areas is startlingly high. Cities are already responsible for a majority of worldwide greenhouse gas emissions, some studies even estimating that number as high as 78% depending on accounting procedures[8]. Future demographic trends are expected to only increase that figure, as countries become more urbanized and cities overwhelmingly become the driving forces behind the world's economy. In fact, 2008 was the first year in human history that more people lived in urban areas than rural areas, and that trend is only expected to grow[9].

With this concentration of both population and emissions, there is potential for greenhouse gas mitigation efforts to take advantage of economies of scale and see larger reductions in emissions for policy changes. Increasing the renewable energy mix by 25% on the power grid of a city of 1 million will result in 100x more carbon dioxide abatement than doing the same for a town of 10,000. Cities give concentrated mitigation efforts a higher payoff in terms of overall world emissions reductions. There are other instances where returns to scale for green initiatives are larger. Increasing energy efficiency can provide huge returns in cities, as density multiplies the effects of making subway cars run on less energy, for example. Additionally, positive externalities and co-benefits are more likely to occur in cities. For example, greening urban areas has more carbon mitigation potential than any other land use type. Studies have shown that trees in cities are able to remove more carbon dioxide from the atmosphere than those in rural areas and provide shade for buildings in the summer and cover in

[7] Ostrom, Elinor. 2009. A Polycentric Approach for Coping With Climate Change, World Bank Policy Research Working Paper 5095; Washington, D.C. The World Bank.

[8] Hoornweg, D., Sugar, L., Trejos Gómez, C., Cities and greenhouse gas emissions: moving forward. Environment and Urbanization. 2011/04/01.

[9] Human Population: Urbanization. Population Reference Bureau.

the winter that reduce energy expenditures in heating and cooling[10]. Given the potential co-benefits of carbon mitigation projects in cities and the expected role of cities in future energy usage, it makes economic sense to center climate policy around them.

There are political factors that make cities ideal to center climate policy around. Cities are often more progressive politically than rural areas and may be willing to pledge more effort and money into aggressive climate change policies. In the United States, for instance, many cities have pledged to the goals of the Paris accord, even as the government on the national level has announced its intention to leave the agreement entirely[11]. People with more politically progressive views tend to cluster in cities and those who place a priority on environmental political issues have a higher willingness to pay for projects that reduce emissions[12].

Differing environmental goals on the local and national level can be reconciled through city autonomy. Multi-level governance theory "accepts the idea that decision-making [is] shared by actors at different levels" and allows for "subnational governments to become part of daily international politics," enabling states and cities to fill the vacuum in the event of federal inaction or withdrawal on an issue.[13] Subnational "governments are...a crucial scale for tackling global climate change." A transnational alliance of cities with strong enforcement mechanisms could have a wide-ranging impact on the global climate conversation and action. The position of regional governments "puts them in a privileged place to deal with environmental issues" because they "have a comparative advantage in terms of...having the technical knowledge of environmental issues" and "encompassing both urban and non-urban realities."[14]

How Local Policy Can Establish a Network

However, there still remains a need to incentivize cities to go above and beyond their countries' lighter pledges and have support from similar cities across the globe.

As a solution, we propose climate negotiations between the world's cities and developing a global governance from the bottom up. A decentralized approach would allow for tiers of

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[10] Shobhakar Dhakal, GHG emissions from urbanization and opportunities for urban carbon mitigation, In Current Opinion in Environmental Sustainability, Volume 2, Issue 4, 2010, Pages 277-283

[11] "America's Pledge Phase 1 Report: States, Cities, and Businesses in the United States Are Stepping Up on Climate Action", 2017.

[12] Longo, A., Hoyos, D. & Markandya, A. Environ Resource Econ (2012) 51: 119.

[13] Joana Setzer, "Testing the Boundaries of Subnational Diplomacy: The International Climate Action of Local and Regional Government."

[14] IBID.

commitment levels between cities and increase the participation rate of global environmental agreements.

With stronger networks between cities that emphasize mitigation of greenhouse gases, more ambitious targets can be set and mechanisms employed, to progress agreements farther than commitments under global environmental accords. Instead of all countries convening at one place to spell out an agreement, cities could be grouped together based on levels of development or ambition to reduce greenhouse gases and work out their own climate targets and mechanism developments. As smaller entities, cities may be able to implement the agreements and adapt more quickly, changing targets and goals and may also see the positive impacts of greenhouse mitigation occur, causing them to deepen their commitments.

Furthermore, cities may be more likely to make deeper pledges to reduce carbon emissions because of the potential for ancillary benefits of reducing the use of fossil fuels, especially in developing countries. Many large cities, like Beijing and New Delhi struggle with air quality and particulate matter due to the burning of fossil fuels. Studies show that citizens are more likely to care about decarbonization if they are affected by ancillary consequences of fossil fuel use[15]. These city governments are likely to be more motivated than their national government to decarbonize their economy and find less polluting sources of energy.

Additionally, through transnational municipal networks, collective funding for clean energy research and investment may spur new breakthroughs. Path-dependent economic theory suggests that as renewables become the main source of electricity in the future, areas that establish themselves as early adopters will experience large growth. Urban networks that can pool resources may increase renewable energy investment, as cities become green hubs and centers of research. Renewable energy, especially solar photovoltaic is expected to become progressively cheaper with technological advances, so cities that develop cheaper sources of renewable energy may well become industry leaders. As the world transitions to renewable energy, having first-mover advantages over the rest of the world will prove economically valuable, akin to being Silicon Valley throughout the technology boom.

There is proof that a bottom-up approach to policy has potential, as there has already been success in growing cap and trade networks from the state level up. California's cap and trade program will continue until at least 2030, by when California has a goal of reducing its

[15] Ibid.

carbon dioxide emissions by 40%. Experts believe that the cap and trade program will prove crucial in meeting that goal. California began planning to implement a cap and trade program in 2006, but after the Western Climate Initiative that would have linked many Canadian and American states under a cap and trade policy failed in 2011, California began its own program in 2012. After experiencing early success, it linked its program to the state of Quebec in 2014, by implementing the same requirements and allowing trade between the two programs[16]. In early 2017, as California was reforming its cap-and-trade program and adding more stringent regulations, Quebec stepped up and agreed to more aggressive rules and Ontario joined in as well, together accounting for 56% of Canadian GDP and 15% of American GDP[17]. Contrasting this with the European Union ETS program, starting new programs on a smaller level allowed for regulators to iron out the kinks before expanding to new frontiers. Additionally, this case demonstrates the way in which local entities will be motivated to adopt more stringent requirements in order to be part of a larger network. Large cap and trade programs are expected to be a critical future market-based element of the world's effort to decarbonize, but according to recent literature, some of the most effective energy policy so far has been renewable portfolio standards for electricity producers[18]. These requirements can be enacted from both the national and state level, but if national action falters, policy will have to move from the bottom up, with more states signing on until a critical mass is reached on the national level.

What California achieved on the state level could be applied to cities as well. By pooling resources and instituting a carbon cap and trade system between each city, the network may expand to other cities that may have initially opted out of negotiations earlier. Wealthier cities would likely be some of the most ambitious in their carbon reduction targets and could also encourage third world cities to establish more stringent mitigation goals by offering financial or technology-sharing incentives to join their network. Through the example of California attracting Canadian provinces to join their cap-and-trade program, mechanisms to reduce greenhouse gas emissions have been most effective when started small and worked upwards. We believe that transnational municipal networks can help fuel this growth.

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[16] Bang, G. & Victor, D. G. & Andresen*, S. "California's Cap-and-Trade System: Diffusion and Lessons." Global Environmental Politics, vol. 17 no. 3, 2017, pp. 12-30.

[17] Manoukian, Jean-Grégoire. "California-Ontario-Québec Harmonized Cap-and-Trade Program - Compliance Digest." Enablon Insights, Enablon, 8 Dec. 2017.

[18] Ellerman, A, Marcantoniniy, C, & Zaklanz, A 2016, 'The European Union Emissions Trading System: Ten Years and Counting', Review Of Environmental Economics & Policy,

Successful Municipal and Regional Climate Networks

Types of Subnational Climate Networks

Networks of local actors provide a path forward for global governance. They allow cities and states to make commitments deeper than those their national governments are willing to agree to, and can also create new framework entities for international negotiations. Type 1 multilevel governance consists of greater authority and independence for local governments in the existing government structure, such as US states and cities having greater independence to represent themselves on the international level. Type 2 multilevel governance entails the creation of an entirely new entity and "sphere of authority" to govern climate policy. Municipal networks such as Cities for Climate Protection (CCP) are examples of this.[19] Type 2 governance allows actors to completely bypass the federal government; that is, the new entity has duties that have traditionally been the responsibility of national governments, such as setting emissions targets and designing a system for monitoring those emissions. Municipal networks allow for the fundamental transfer of political power in global negotiations from nation-states to transnational networks, which could allow for more stringent targets and more efficient negotiations. CCP entirely "bypasses the nation-state" and allows cities to "take a position that may go against that of their national governments."[20]

Transnational municipal environmental networks have existed since the 1970s, but networks of regional governments are far rarer. Examples of existing regional environmental networks include the Under2 coalition and the Network of Regional Governments for Sustainable Development (nrg4SD). They "mostly foster cooperation between subnational governments and stimulate policy learning." The multilevel governance "perspective places most of its attention on cities...without giving sufficient attention to regional governments."[21] Ensuring proper focus on regional government will allow for maximum impact. International diplomacy undertaken by state and city governments has included "having representations abroad...and entering bilateral and multilateral relations with nation states and/or other subnational governments across borders." The concept of 'city diplomacy' "is driving the emergence of an

[19]Michele M. Betsill and Harriet Bulkeley, "Cities and the Multilevel Governance of Global Climate Change", 12 Global Governance (2006).
[20] Ibid.
[21]Joana Setzer, "Testing the Boundaries of Subnational Diplomacy: The International Climate Action of Local and Regional Government."

influential urban international agenda led by mayors of major metropolises."[22] Transnational networks provide benefits in a wide variety of areas, from "fostering policy learning" to "GHG emission reduction strategies" to the critical piece of "facilitating the bypass of nation-states and [applying]...pressures from multiple levels and directions."[23] We thus recommend the formation of a transnational network similar to the Covenant of Mayors with strong enforcement mechanisms, but composed of regional governments.

A problem arises in that the transnational agreements are generally "soft law, namely recommendations" that "are limited by their voluntary nature." Soft law "creates a loose and adaptable framework in which information, ideas, and resources are shared" and is "highly effective."[24] For instance, transnational "efforts to address climate change have achieved goals similar to those imposed by the Kyoto Protocol" through "a bottom-up process." "Subnational governments are pressuring the UN to provide a clearer position on what role they should have in international environmental negotiations and in the implementation of environmental agreements."[25] The UNFCCC at the Cancun Conference "recognized the need to engage...subnational governments for effective action on all aspects of climate change" and therefore local governments have begun to "call for the introduction of a new category of 'government stakeholders' among the accredited observers to the UN system."[26] Strong and wide-reaching transnational networks can have greater authority and success in pressuring the UN for this ability.

Similar to the format of a climate club, there are "several types of resources that give networks leverage across borders: the diffusion of information...the pooling and distribution of financial, managerial and technical resources...and the establishment of a set of standards outside" of the federal sphere. These are incentives that can be used to encourage cities to join a network. The functions of a TMN include "agenda setting, capacity building, and integration across different global environmental governance areas."[27] This is the right time for the emergence of TMNs as a leading force in global climate negotiations due to "growing

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[22]Ibid.
[23]Ibid.
[24]Joana Setzer, "Testing the Boundaries of Subnational Diplomacy: The International Climate Action of Local and Regional Government."
[25]Ibid.
[26]Ibid.
[27]Bulkeley, H., Andonova, L., et al. (2012a). Governing climate change transnationally: Assessing evidence from a database of sixty initiatives. *Environment and Planning: Government and Policy, 30, 591.*

dissatisfaction with the model of mega multilateralism that dominated global environmental politics...and an increasing fragmentation of governance authority."[28] Local government networks have risen "to fill voids created by the absence of national or international intervention." These initiatives "fill in what governments are not (yet) willing or able to regulate...and show alternatives for public governance."[29] For instance, chemistry businesses formed the Cement Sustainability Initiative and Responsible Care program "to preempt demands for more stringent measures from states or international organizations."[30]

Domestic and International Legal Issues with Transnational Diplomacy

In the 2010s, local and regional governments engaged in real international climate agendas, growing into "key actors in global climate governance."[31] A problem arises in that there remains "a limited consideration of the legal capacity of" subnational governments to engage in international negotiations due to "potential limitations imposed...by international and domestic legal orders." Brazil provides a helpful case study of a country that technically bars subnational diplomacy but whose Supreme Court interpreted the laws in a way that allowed for significant expansion of federal government-sanctioned subnational diplomacy. Brazil's "legal system does not provide for international actions undertaken by subnational entities" and the "1988 Constitution establishes that the federal government" is "the sole sphere responsible for" foreign relations. This strong language asserts the federal government's authority, and subnational governments are simply "not included...in public international law." Despite this, "the diplomatic agendas carried out by Brazilian states and municipalities" ended up being "institutionalized within the Ministry of Foreign Affairs and within the Presidency,"[32] proving that it is possible for subnational entities to conduct international diplomacy despite constitutional limitations. Brazilians acknowledge "there is a clear inconsistency...despite the lack of legal competence, subnational diplomacy does take place and...is quite significant." It is possible to work within existing legal framework and still allow subnational governments to negotiate internationally and achieve concrete results.

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[28]Bulkeley, H., Andonova, L., et al. (2012a). Governing climate change transnationally: Assessing evidence from a database of sixty initiatives. *Environment and Planning: Government and Policy, 30, 591.*

[29]Ibid.

[30]Ibid.

[31] Joana Setzer, "Testing the Boundaries of Subnational Diplomacy: The International Climate Action of Local and Regional Government."

[32]Ibid.

In 2005, in part due to the desires for subnational climate diplomacy, Federal Deputy Andre Costa proposed a constitutional amendment to "authorize subnational diplomacy," which was rejected on the grounds that the constitution does not explicitly prevent subnational negotiations.[33] The interpretation of the constitution to allow subnational diplomacy is a signal to subnational governments across the world to push forward with their agendas and to legally challenge any questions about their authority. The Brazilian government embraced the court's decision and began to "undertake initiatives at the federal level to institutionalize subnational governments' international relations." In 1997, Brazilian President Fernando Cardoso created a Federative Relations Advisory Board "and regional representation offices were established in different states." The goal of the board "was to advise states and municipalities on their foreign relations." This was later expanded into a Special Advisory Board for Federative and Parliamentary Affairs.[34] The creation of these boards "confirmed Brazilian subnational governments' legitimacy to engage in diplomacy," and thereafter the federal government "recognized the transnational initiatives promoted by states and municipalities and aimed to support them in this agenda," a major step forward for climate action. "The response of cities and states was positive" and "by 2012 almost all state administrations maintained an international agenda and an international relations structure." There is clear potential for subnational diplomacy to expand across the world.

On the domestic level, "few countries have legislated explicitly on the international capabilities of subnational governments" and many governments actually explicitly allow for subnational entities to conduct diplomacy; for instance, since 2007 France has allowed subnational governments "to enter agreements...worldwide." Belgium "accepts representatives from subnational governments in national delegations for international meetings" and Argentina "explicitly granted foreign policy powers to its subunits," which in 1994 was added to the constitution. In the US, states "do not have the power to enter into treaties" but "the facts on the ground are...challenging [that] conventional wisdom."[35] For instance, California "completed its first joint carbon emissions trade with Quebec" after "linking their cap and trade programmes" in 2014, which "enabled the mutual acceptance of compliance instruments issued by each

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[33] Ibid.

[34] Joana Setzer, "Testing the Boundaries of Subnational Diplomacy: The International Climate Action of Local and Regional Government."

[35] Ibid.

jurisdiction, and... joint auctions of GHG allowances."[36] California "has also held talks with the EU about" climate action, successful skirting federal authority. The US government has adapted to this new reality, with State Department's "Special Representative for Global Intergovernmental Affairs engaging with transnational networks of subnational governments...to further the global needs of state and local officials."[37]

An example of a successful environmental agreement that resulted from subnational talks was "the Governors' Climate and Forest Taskforce, a subnational collaboration between 19 states and provinces from seven countries ranging from Peru to Nigeria to Spain." The question remained as to what would happen if subnational entities took a position that conflicted with the national government. This was clarified in 2009, when states from the Amazon region took positions that contradicted the federal government, forcing the president to negotiate with the governors to come up with a "Brazilian position that could be taken to COP-15."[38] An alliance of states could catalyze and organize opposition to the federal government stance. Part of the recommended TMN is a legal advocacy division that works to shift international and domestic legal framework "to further accommodate subnational diplomatic activities."[39]

Subnational Actors at UNFCCC Negotiations

The Paris Agreement went further than previous global climate negotiations in allowing for greater participation and input from cities and states. At COP21, municipal and state entities were given more opportunities to make their voices heard than in previous negotiations. The NAZCA portal allowed cities and states to officially register their goals and ended up including 11,000 commitments from thousands of cities and hundreds of states across the world. This was an "unprecedented showing of action and support" from local communities that was "widely credited as an important factor in Paris' success."[40]

At the Paris Conference, the "first-ever dedicated subnational action day" occurred.[41] While the UNFCCC "has served almost exclusively as a forum for negotiation among national governments, "COP21 marked a turn in the evolution" of the agency that "opens new

[36] Joana Setzer, "Testing the Boundaries of Subnational Diplomacy: The International Climate Action of Local and Regional Government."
[37] Ibid.
[38] Ibid.
[39] Ibid.
[40] Paris Climate Agreement Q&A. (2017, October 26).
[41] States & Regions Alliance. (2017, November 10).

opportunities for engagement" by non-federal actors, who will "play an increasingly important role in shaping and implementing parties' NDCs."[42] This shift in valuing subnational actors could result in a fundamental evolution of COP, which consistently returns to increasing subnational and non-state actor participation.

Recording Commitments from Transnational Networks and their Subnational Actors

The Non-State Actor Zone for Climate Change (NAZCA) is a comprehensive database of commitments from subnational actors."[43] Showing the impact that local action can have on international negotiations, the NAZCA database "was a central tool...to build momentum and support the adoption of the universal climate agreement at COP21."[44] In total, 7025 cities have taken action. These cities are located in 99 countries, have a population of 794 million people, and contain "around 32% of global GDP." 97 of the 300 top-GDP world cities are engaged in NAZCA.[45] Total NAZCA commitments also include 209 regions, with 12549 total commitments from 180 countries.[46] NAZCA "plays a key role in providing visibility and mobilizing broader engagement."[47] The data from the local and regional governments displayed on the portal is provided by partners including transnational networks such as the Covenant of Mayors and the Climate Group States and Regions Alliance.[48] NAZCA has great potential in harnessing the power of local governments to take concrete action to reduce GHG emissions as well as to push global climate agreements to be more comprehensive.

Successful Transnational Networks of Municipal and Provincial Governments

The States and Regions Alliance was created in 2005 with the Montreal Declaration, and is "a network of 39 governments from six continents which account for 368 million people [and] 2.9 gigatons of CO2 emissions," all of whom "are spearheading impactful climate policy in their

[42] Wei, D. 2016, "Linking Non-State Action with the UNFCCC."
[43] Angel Hsu et al., "The Wider World of Non-state and Subnational Climate Action", 10 December 2015.
[44] "NAZCA." *NAZCA - Climate Action*, climateaction.unfccc.int/about.
[45] Angel Hsu et al., "The Wider World of Non-state and Subnational Climate Action", 10 December 2015.
[46] "NAZCA." *NAZCA - Climate Action*, climateaction.unfccc.int/about.
[47] Ibid.
[48] Ibid.

communities."[49] The Alliance is providing resources to localities throughout the world to "limit emissions by 2020 and achieve net-zero emissions by 2050."[50] The members of the alliance are "committing to 100% renewables, investing in cleantech infrastructure, [and] linking emissions trading systems." They are "setting ambitious climate targets" that are "less motivated by overarching global goals and more by local needs."[51] The Alliance is managed by the Climate Group, which works with the member governments to "accelerate the pace of climate policy development" and "provide a forum for peer-to-peer learning."[52] It also measures the commitments and action taken by its member states. This type of alliance has led to tangible action at the international level; for instance, members of the Alliance signed the Poznan Statement at the 2008 UNFCCC conference in Poland. Alliance members have also had their own summits; for instance, in 2010, member states gathered and "committed to develop low carbon policies and regular reporting." The following year, "over 50 subnational government leaders signed the Clean Revolution Statement at the Rio+ 20 Earth Summit."[53] In 2013, the founding of NAZCA and the Compact of States and Cities were due in part to the advocacy and actions taken by the States and Cities Alliance.

The Compact of States and Regions, approved in 2014 at the UN Climate Summit in New York by groups including the States and Regions Alliance, nrg4SD, and R20, is "designed to provide a transparent, global picture of efforts to tackle climate change on the part of state and regional governments" with a goal of "encouraging more governments to set goals and measure progress." The leadership shown by cities and states "can inspire national governments" to take more stringent action.[54] In order to join the Compact, state and local "governments are required to make a public commitment to reduce greenhouse gas emissions and publicly report a standard set of greenhouse gas data on an annual basis."[55] By 2015, 44 subnational governments had "reported commitments to the Compact of States and Regions."[56] Over two thirds "of States and Regions members have adaptation plans in place, and 13 governments share innovative policy approaches through the Adaptation Peer Forum." For instance, countless governments ranging

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[49] States & Regions Alliance. (2017, November 10).
[50] Ibid.
[51] Ibid.
[52] Ibid.
[53] Ibid.
[54] UNFCCC.com. "Compact of States and Regions: Subnational Initiatives Driving Climate Ambition." *UNFCCC,*
[55] Ibid.
[56] States & Regions Alliance. (2017, November 10).

from Connecticut to Scotland have provided "incentives toward purchase of new plug-in electric vehicles."[57]

The Global Covenant of Mayors for Climate and Energy's mission is to be "an international alliance of cities with a long-term vision of supporting voluntary" climate action.[58] There are also Regional Covenants that are subgroups of cities part of the global Covenant. The Covenant works to support "ambitious, locally relevant solutions captured through strategic action plans that are registered, implemented, monitored, and publicly available"[59] and includes "7400 local governments from 6 continents and 121 countries representing more than 600 million residents."[60] All cities, "regardless of size or location...may commit" to the Covenant. In order for a city to join, they must "submit a commitment text" signed by the mayor and city council. It is recommended that the city pledge to, within three years, "develop...and report on a community-scale GHG emission inventory...ambitious, measurable and time-bound target(s) to reduce greenhouse gas emissions...including regular progress reports."[61] Furthermore, "continued membership...is contingent on complying with the requirements within established timeframes."[62] This enforcement piece is critically important to the success of the Covenant.

Local Climate Networks in the United States Following President Trump's Announcement to Withdraw from the Paris Agreement

Local climate networks that arose to achieve American NDCs can be used as a case study of the impact that subnational networks can have on climate action. The US NDC for the Paris Agreement had been a 27% reduction of GHG emissions by 2025, in relation to the emission level in 2005. After Trump announced his intent to withdraw from the Paris Agreement, a coalition of US states, cities, and businesses vowed to uphold their commitments. "Outside experts" will "measure the effects of their pledges" on emissions by 2025. Those who have pledged to remain represent 130 million Americans and 6.2 trillion of US economy. The group is called America's Pledge and includes 350 cities and counties and 20 states. This 'We Are Still

[57] Ibid.
[58] History - Compact of Mayors.
[59] Ibid.
[60] Ibid.
[61] Ibid.
[62] Ibid.

In' coalition was present at the Bonn climate conference and is led by California Governor Jerry Brown and former NYC mayor Michael Bloomberg. The effects of "climate-friendly policies that are already in effect at local levels, whether or not they are part of the coalition,"[63] will be compared with no changes as well as America's original NDC. It's also difficult to determine a uniform criteria to use to evaluate the commitments of the various subnational actors; for instance, a business that is in a state and city that are also participating in the coalition presents a difficult conundrum to those evaluating the commitments of the three. To avoid double counting, it is best to have the business reductions be counted as part of the city and state reductions.[64]

The combined GDP of the cities and states in We Are Still In coalition is 10.1 trillion and therefore "make up the third largest economy in the world," behind only the US's 18.6 trillion and China's 11.2 trillion. There was a push at Bonn for the coalition members to "submit reports on their progress towards their emissions-cutting goals to be subject to the kind of monitoring and accountability that is required of national governments under the UN process" for the Paris Agreement. A delegate from Papua New Guinea said, "they should be accountable [on their progress in meeting their voluntary goals]. Will they be willing to be reviewed on their results, not just on the blather?" A We Are Still In official said that "the draft text was aimed at giving these contributions "a legitimacy" under the UN's rules" and was meant to ensure transparency. It would put voluntary "commitments in line with UN standards, and could therefore be included in the national greenhouse gas inventories required from countries."[65]

The reality is that there are limits to what non-state actors can do because "they are excluded from many of the technical talks and cannot tap into federal funds that [federal actors] use to finance commitments to slow climate change."[66] In reference to working with America's Pledge, a UNFCCC spokesperson said that UNFCCC is "extremely supportive of the whole mass of cities, states and territories who have been aligning themselves with the Paris agreement."[67] The commitments are a first step, but they do not reach the degree of reduction that America would have contributed under the Paris Agreement. Therefore, higher emission targets must be set and there must be concrete mechanisms to reach those goals, potentially by shifting We Are

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[63]Ibid.
[64]Ibid.
[65]Harvey, F., & Watts, J. (2017, November 11). US groups honouring Paris climate pledges despite Trump.
[66]Ibid.
[67]Ibid.

Still In into a climate club-like municipal network that would draw in cities across the US.

At Bonn, the We Are Still In coalition released the America's Pledge report. It outlined the plan to adhere to the Paris Agreement targets by focusing on subnational actors. States and cities that make up over half the US economy have pledged to uphold the US commitments to the Paris Agreement. The number of cities and states "taking concrete actions that reduce GHG emissions" is even larger.[68] Importantly, "the potential effect of increasing the reach and ambition of non-federal climate actions has not been adequately analyzed and taken into account in the Paris Agreement framework."[69] The time is right for comprehensive and far-reaching emission reductions by local entities; "cleaner energy and electric transportation are emerging as...cost leaders." The primary ways that the cities and states will reduce emissions include increased use of electric vehicles, "improvements in the energy performance of buildings, increased use of renewable energy, and significant improvements in the carbon intensity of manufacturing."[70]

Cities and states have had an increasingly large influence on climate policy, based on cooperative federalism "where energy, transportation, and land use decisions are made at the local level." The "20 US states and 110 cities" part of We Are Still In "have enacted quantified GHG reduction targets," with some such as those of California and New York already being "as ambitious as the most ambitious NDCs submitted by parties to the Paris Agreement."[71] "Between 2005 and 2015, the US economy grew by 15% while net GHG emissions declined by 11.5%."[72] This shift was most visible in the electricity sector, which shifted dramatically from coal to renewable sources, and was in large part a result of "regulatory innovation and renewable portfolio standards set by states and tribal nations [and] renewable energy targets set by cities."

Cities and states have the potential to drive significant change in the US energy sector, and the burden falls on them following the Paris Agreement withdrawal. The transportation sector is on the verge of a shift toward electric vehicle[73] The actions of cities and states in a TMN could be the spark that accelerates and fully enacts this shift. It's critical that in order to come close to the US Paris Agreement goals, "additional policy interventions be developed

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[68] "America's Pledge Phase 1 Report: States, Cities, and Businesses in the United States Are Stepping Up on Climate Action", 2017.
[69] Ibid.
[70] "America's Pledge Phase 1 Report: States, Cities, and Businesses in the United States Are Stepping Up on Climate Action", 2017.
[71] Ibid.
[72] Ibid.
[73] "America's Pledge Phase 1 Report: States, Cities, and Businesses in the United States Are Stepping Up on Climate Action", 2017.

quickly through greater ambition and follow-through by non-federal actors."[74] This "will require non-federal leaders to convert existing commitments into action, while also expanding and accelerating action, including taking advantage of...opportunities" such as "spurring the adoption of EVs through ZEV mandates and EV purchase consortiums, significantly enhancing the performance of our buildings, advancing renewable energy through mandates and incentives, and aggressively phasing out non-CO2 pollutants, particularly methane."[75] Cities and states showing that "the clean energy economy builds more equitable prosperity and creates jobs will help increase confidence across the political spectrum that climate action is good for the economy, motivate non-federal players to embrace more ambitious interventions," which will spur further action and make it politically feasible for more states and cities to join the We Are Still In coalition as well as "lay the foundation for future re-engagement by the federal government on climate policy"[76] following the 2020 presidential election. "The multilateral process that created the Paris Agreement was, by its nature, a negotiation among nation-states" and cities and states "were actively engaged alongside the national government" at COP21.[77] Actors such as cities and states have led the way in climate action in the US, for instance with states establishing "the first renewable portfolio standards and cap and trade programs" while cities "have been a proving ground for clean energy innovations such as electric vehicles." Furthermore, "non-federal actors have been early leaders in reshaping markets, as demonstrated by state and city municipal green building programs and procurement of large-scale renewables."[78] America's Pledge, or the We Are Still In coalition, "aims to compile and quantify the actions that cities [and] states...are taking to drive down their GHG emissions."[79] States have not only pledged to uphold their commitment to Paris Agreement but also are "adopting quantifiable GHG emissions targets," some of which -- particularly in large states such as California and New York -- "are as ambitious as the most ambitious NDCs."[80]

The next step is adequate monitoring and enforcement of the commitments that these entities pledge to make to uphold the agreement. The US Climate Mayors, which had been

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[74] Ibid.
[75] Ibid.
[76] Ibid.
[77] Ibid.
[78] "America's Pledge Phase 1 Report: States, Cities, and Businesses in the United States Are Stepping Up on Climate Action", 2017.
[79] Ibid.
[80] Ibid.

formed when the Paris Agreement was first passed, “expanded rapidly” after Trump announced intention to withdraw and includes 383 cities that have committed to Paris Agreement goals. Importantly, “over half are in states that have not joined the US Climate Alliance”; cities in conservative regions could be the key to effective and widespread climate action.[81] The next step is to combine these organizations under one umbrella organization, and then ensure proper monitoring and enforcement of the commitments. States and cities “have for years set their own GHG emission reduction targets...that, if achieved, would help meet their share of both near-term (2025) and longer-term deep carbonization targets.”[82] It’s critical to make these targets even more far-reaching “and ensure follow through in order to meet the goals of the Paris Agreement.” in the US, 20 states and 110 cities “have enacted GHG targets.” However, these targets “vary in level of ambition” and are also “voluntary and could be dropped with little consequence, and others were adopted under previous political leadership, and may already be irrelevant.”[83] Therefore it’s important to create a transnational network of in the form of a climate club in order to ensure that the emissions targets are actually met.

Due to geographic and environmental conditions, the states that wind and solar energy is most profitable in are also some of the most conservative and pro-Trump states, such as Texas -- where wind “will be the largest source of power” by 2018 -- and Mississippi and Alabama, which have some of the “fastest growing solar markets.”[84] These states could be targeted through a climate club format simply due to economic benefit that would result from investment in renewables. If deeply pro-Trump states join the network, it could spur a shift in action from the federal government and would be a powerful symbol and call to action on the international stage. In many areas, states are actually more effective mechanisms than cities to implement emissions reductions. For instance, US “state governments are the primary regulators of US energy markets, and hold authority over a raft of policies and measures that further drive this transition, such as carbon-pricing systems, renewable portfolio standards, and energy efficient targets.”[85] Furthermore “state-level public utility commissions directly regulate utilities and can levy funds for further renewable energy investment.”[86] Therefore a transnational network of state and city

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[81] Ibid.
[82] Ibid.
[83] "America's Pledge Phase 1 Report: States, Cities, and Businesses in the United States Are Stepping Up on Climate Action", 2017.
[84] Ibid.
[85] Ibid.
[86] Ibid.

governments could actually create new reforms in areas that the federal government does not exercise direct authority over.

Initial Recommendations

Focusing on states and cities is the clear path forward in the Trump era following America's decision to withdraw from the Paris Agreement. It is recommended that one umbrella organization be created, using existing organizations such as The Climate Group, an NGO that has created and managed municipal climate networks. This organization would form two transnational climate networks. One is an international network of municipal governments and the second is an international network of provincial and state governments. Under the two international networks would be subnetworks in certain regions; for instance, there could be a US municipal subnetwork or a subnetwork of provincial-level governments in South America. These would have the flexibility to, for instance, set targets even stronger than those agreed to at the international level. This would tie various current networks into one central organization, which would provide greater unity and ensure broader enforcement. The Global Covenant of Mayors is the closest example of a successful transnational municipal climate network, though its enforcement and accountability procedures must be improved. The We Are Still In coalition has created an initial network that has already achieved involvement from 350 cities and 20 states. That network could be expanded internationally, creating an umbrella international network that would contain regional sub-networks. The current US networks would be combined into a subnetwork that would be part of this, which would be separated into city and state governments due to the variability in jurisdiction and structure. Those that voluntarily offer to current US climate networks are not subject to the same level of accountability and rigor from the UN that national entities to the Paris Agreement must undergo. It is therefore critical to ensure that the proposed network uses an incentive-based format to create the proper mechanisms to ensure compliance among its members, and that its members significantly deepen their targets in order to reach the original US NDC targets. The US regional subnetwork could function like a climate club, and would represent the US on an international level in an official capacity as a form of almost parallel representation to the US national government. The climate club incentive-based framework would focus on the idea that it is economically beneficial and

provides economic incentives for climate action, which would be an effective way of spurring cities to adopt emissions targets and green energy programs. They could pool resources to, for instance, purchase renewable energy sources such as solar panels. The umbrella network would be a transnational municipal and regional climate network with broad membership of cities and states in all regions of the world with a particular focus on including developing nations, using the NAZCA portal commitments as a basis to rally cities into the network. This would also use a climate club incentive-based format and structure to ensure compliance and to deepen commitment beyond the Paris Agreement targets.

Obstacles and Criticisms

This section of the paper will attempt to preemptively address potential criticisms and problems that may arise from our proposed TMN. Bansard et al. provide an excellent overview of some of the problems with TMNs in their current implementation; their analysis includes ambition levels, monitoring mechanisms, geographic homogeneity, and duplication, and identifies each as a potential weakness of TMNs.[87] We will respond to each of these issues in turn in the following sections. After this, we move to other criticisms and pitfalls that TMNs may fall into. We discuss ways to ameliorate problems with national sovereignty that a transnational network may create. Finally, we address the problem of trade leakage in trans-municipal networks, and how it may be resolved.

Ambition

The majority of TMNs "do not set quantified emission reduction targets to begin with and the ambition level of the four networks that do is highly variable." Furthermore "only two of thirteen TMNs set more ambitious targets than the average of targets set by Parties to the UNFCCC." This part of a broader problem; namely, that "most TMNs focus on soft mitigation measures (such as fostering knowledge exchange or capacity building) rather than quantified mitigation targets." [88]

[87] Bansard et al.(2017)
[88] Ibid.

Our proposed TMN differs in that it establishes concrete benchmarks and emission reduction targets, then uses an incentive-based 'climate club' mechanism to enforce the commitments and ensure that governments follow through on their targets.

It is important to note that ambitious targets are no guarantee of success where climate policy is concerned. The Kyoto Protocol possessed very rigorous goals but was a failure all the same. Regional groupings and subnetworks in our TMN will have some level of autonomy in setting their goals, allowing tailored emissions goals that are achievable in a reasonable timeframe. Because success in reaching stated goals is one way to build institutional respect and authority, there is merit in applying a cautious strategy to nascent TMN emissions reduction goals.

Monitoring Issues

As diplomats at Bonn have noted with regard to the We Are Still In coalition, forming concrete targets and ensuring proper enforcement is critical. There are also "nine of thirteen TMNs [that] do not have any reporting mechanisms in place while only two networks have explicit provisions for monitoring and reporting"[89] and therefore new TMNs must improve by ensuring increased reporting and comprehensive measurement of how they reached their targets.

Monitoring issues are complex challenge for any TMN, due to their cost and the difficulty of implementing them on a scale wide enough to be effective. One TMN that has had some success monitoring the compliance of their member cities is the Covenant of Mayors. For our TMN, we propose a measuring inventory similar to the Covenant of Mayors' Global Protocol for Community-Scale Greenhouse Gas Emissions (GPC) inventory. The GPC inventory has numerous advantages that would allow it to perform well in a wide variety of urban and regional conditions. The most important characteristic from an implementation perspective is the incremental build-up of reporting responsibilities; instead of immediately requiring complete data reports, the GPC spaces out waste, energy, and travel sectors over a period of 3 years, allowing member cities to spread out the initial cost of creating data collection policies for the inventory.[90] Further benefits include a split between mitigation and adaptation plans, and a

[89] Ibid.
[90] Definition of Compliance.

hazards reporting requirement that may facilitate the formation of subnetworks between cities and regions that face similar climate challenges.

Geographic Homogeneity

One issue with currently extant TMNs is their presence almost exclusively in European and North American cities. While there are a few participants located in the developing world, this membership is not proportionate with their share of total global emissions, either now or in the future. This may cause problems if TMN structure

A corollary problem is that in large, diffused institutions such as TMNs, it is inevitable that certain actors within the network will become more or less prominent than the average. Certain large cities take the lead in organizing and setting policies for the TMN. Of these cities and regions, often referred to as "super-connectors" due to their membership in large numbers of TMNs, not a single one is situated within a developing country, and most are in the US and Europe.[91]

We do not deny that the current geographic homogeneity of TMNs represents an issue, both now and in the future. Our proposed network attempts to resolve this via outreach to lower-income cities and those in developing countries in order to ensure geographic diversity. A network with greater geographic diversity has a larger degree of leverage in international negotiations as well as greater legitimacy to federal and international actors. As our proposed TMN continues to conglomerate and refine existing networks under its umbrella, cities and regions currently outside the network, including those in developing countries, will have more economic and political incentives to join.

Duplication

Duplication, the process of some regions and cities falling under the auspices of multiple different TMNs, is another problem faced by current TMNs. This is currently a problem of particular potency in the US, with the rise of a variety of different groups following Trump's announcement of intent to withdraw from the Paris Agreement; establishing one network would be simpler and lend that network greater authority. This is addressed by the structure of our

[91] Bansard et al. (2017)

proposed transnational network; there is an international umbrella transnational network, with subgroups in each region. Regional and municipal governments will be part of separate transnational networks. The centralization of top-level authority for various networks will, along with the regional/municipal separation, allow for more efficiency in areas of coverage and less duplication than exists today under decentralized TMNs.

National Sovereignty

The question of respecting national sovereignty is a more abstract one, and lacks empirical basis, but is important to consider nonetheless. Issues of legitimacy that low-level coalitions such as trans-municipal networks will face are important to resolve if they are to become a more central institution in the fight against climate change.

Where our proposed TMN is concerned, we recommend a case-by-case basis of review to determine how best to operate given national laws and regulations. While in the next section we discuss potential opportunities to be found in the recent wave of nationalism spreading through certain developed countries, this nationalism also has the potential to create difficulties for the implementation of an effective TMN, due to conflicts with national authorities. We acknowledge the problems inherent in sub-national units making binding international commitments, and recommend that voluntary association, with locally-originated monitoring but no enforcement, may be the answer for cities that cannot legally join the TMN proper. In this manner, they can work in parallel with our proposed TMN, despite the political impossibility of their joining.

Trade Leakage in TMNs

Another criticism that can be directed towards our proposed focus on TMN equivalents deals with their potential inability to halt trade leakage from participating cities, in much the same way as current international agreements are unable to halt it from their signatories. Trade leakage has been a serious problem for many states and regions seeking to reduce their overall emissions levels. The European Union, despite heavy political and financial commitments towards doing so, has not succeeded in reducing their emissions consumption levels, only their domestic emissions. (CITE) This implies that all of the pollution formerly occurring in the EU has simply been shifted elsewhere by their policies.

Luterbacher, Norloff, and Vinuales[92] make a compelling argument that partial global mitigation efforts will be greatly stymied by current World Trade Organization regulations preventing like goods with different manufacturing processes from being discriminated against, regardless of their origin. These anti-discriminatory practices, put into place in the name of free trade, currently serve to prevent countries from specifically punishing emissions-heavy production processes in order to promote sustainability. Their conclusion is that either a critical mass of countries willing to engage in non-compliance with WTO policies is necessary, or that the WTO must fundamentally change portions of the General Agreement on Trade and Tariffs (GATT) to allow for this type of discrimination.

At first glance, the diffuse nature of TMNs deprives them of the influence and central authority necessary to challenge the already established WTO. This problem of a central authority, however, is resolved in our proposal by the presence of an umbrella organization capable of acting as a negotiator where higher-level institutions are concerned.

WTO dispute resolution and enforcement procedures have already proven to be obstacles for some national-level efforts to regulate imports based on emissions standards[93] However, the current rise of populist politics in several developed countries may provide opportunities to weaken WTO authority in the near future. As an example, President Trump has gone on the record considering ignoring the WTO entirely in favor of America's national interests.[94] While the current U.S. administration's goals for this decision are likely different than our own, they would still establish a useful precedent for future possible conflicts with the WTO.

Our proposed TMN also has the potential to be more flexible on a case-by-case basis in ameliorating current national commitments to WTO trade policies due to its ability to take advantage of opportunities at both regional and municipal levels. As differences in individual national governments may provide different subnetworks of our TMN with different opportunities to work around extant trade policies.

Additionally, a theoretical globe-spanning TMN possesses a market share of over 70% of the world's emissions.[95] This provides it with a stronger economic negotiating base than any given country, and one that is comparable or superior to the multi-country coalitions identified as

[92] Luterbacher et al. (forthcoming)
[93] Ibid.
[94] Gillespie, P. (2017, March 3). Trump administration: We may ignore World Trade Organization.
[95] Ibid.

a key component in challenging WTO policies. We thus argue that our proposed TMN is a viable alternative to conventional international state-based coalitions for ameliorating the effects of already-established harmful international institutions, due to a superior ability to work around current regulations and a theoretical potential to influence change in these institutions in the future.

The Global Future: A Time-Sensitive Transition

Compelling reasons exist to act now on the issue of climate governance. Mitigation and adaptation costs only rise as action is delayed,[96] so the adoption of an effective climate governance is in the long-term fiscal benefit of the international community. Our proposed TMN has the capability for more rapid spread than traditional international climate agreements due to its capacity for absorbing existing networks and its subnational focus allowing local influencing efforts to be more effective. There are additionally immediate short-term economic and political advantages to adopting a TMN focused approach to climate governance.

An important consideration in designing climate policy should be future-proofing institutions, such that minimal adaptation will be needed from them as conditions change in the future. As discussed earlier in our paper, the increasing urbanization of the world carries with it an increase in the percentage of the world population existing in urban areas; already over half of the global population is living in cities. These areas, the most demanding in terms of resource consumption and emissions production, correspondingly have the greatest ability to make an impact on global emissions levels. It is sensible for the bulk of our emissions reductions efforts to be focused on the regions that cause the bulk of our emissions. Levin et al (2012) make particular note of "sticky" policy solutions being necessary to combat the super wicked problem of climate change. Our proposed TMN meets the criteria in Levin et al. (2014) for a sticky policy solution: its modular design and city-by-city nature allow for progressive growth of the populations participating in the policy solution, while also entrenching support due to buy-in costs of sustainable technology initiatives. As cities are projected to grow in the coming decades, the total population that the TMN is covering will increase, regardless of the admission of new cities to the network.

[96] Volker & Keywan (2009)

An increase in the regulatory power of TMNs today in countries not already fully committed towards climate actions will have beneficial effects on their commitment levels in the future, a positive feedback loop that may be initiated in already-progressive cities. This long-term commitment issue, a key part of the triple dilemma that has troubled democratic policymakers when dealing with climate issues on the international level, may be partially solved by our proposed TMN's ability to build robust support for policy implementation on multiple subnational levels, as well as exploiting the naturally progressive nature of cities to entrench this support.

Our proposal thus takes into account the ongoing paradigm shift towards an urbanized globe and preempts potential future conflict that could emerge due to urban areas being underrepresented in their influence on climate governance.

Future Research

We have discussed recommendations and proposals for improvements necessary for moving past specific criticisms of TMNs in Section 5. This passage will discuss ideas for future research, as well as generalized recommendations for municipalities interested in expanded TMNs.

We suggest further study of effective monitoring solutions for TMNs, with particular focus on the Covenant of Mayors' system, which has proven effective. The possibility of subnetworks designing their own monitoring criteria with CoM guidelines as a base should also be considered. We are also interested in the potential usage of synchronized regional subnetworks in information and technique sharing, but are too limited by space to address it fully. Subnetworks of financing is also a topic of further study, as is inter-regional carbon cap-and-trade networks as they become more prolific.

Another avenue of research that should be considered lies with the exact organizational structure of our proposed umbrella organization. We acknowledge that our initial proposal does not automatically contain a solution to the lack of central authority in climate governance, as identified in Levin et al. (2017). Further research into institutional design, and exactly how much flexibility subnetworks should maintain while still being bound to the overarching goals of the umbrella organization, should be undertaken.

Conclusion

Anthropogenic climate change is not an issue that will wait for the possible eventual success of top-down international climate negotiations. In this paper we have argued that city-based, bottom-up networks provide an effective and durable solution to the same issue. We do not necessarily argue for the implementation of widespread and authoritative TMNs as a panacea for the collective action problems of the international community, to do so would be naive. Rather, we see a unified and flexible global TMN as a key component in a multi-level approach to climate governance. We have provided a comprehensive overview of how these institutions currently exist, addressed criticisms of their efficacy and provided recommendations for future implementation. Our proposed solution possesses characteristics that have the potential to reduce or eliminate many raised criticisms of currently extant networks.

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