Capacity to Act: The critical determinant of local energy planning and program implementation

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Summary: Local authorities are increasingly developing energy and climate plans to outline a path towards a more sustainable energy future for their city. Because cities are "creatures of the state", however, it is unclear whether local authorities have sufficient policy competency, or capacity to take action to deliver on the goals laid out in their plans. To date, capacity to act has been an under-theorized topic, making it difficult for researchers to systematically assess whether one city, or a group of cities, can deliver on their energy or climate goals. In this paper, we discuss three alternative approaches to assess capacity to act, each of which each of which varies in their effectiveness given the purpose and size of the analysis.

Keywords: capacity to act, new institutionalism, policy levers, urban energy systems, New York City, London

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I. INTRODUCTION

Cities have long been a subject of considerable fascination to researchers. From fundamental questions of why cities exist, to questions of how broken urban economies can be "fixed" so once-great cities can rise again, there is a rich literature encompassing elements of economics, sociology, history, geography, engineering, and political science.

Within this literature, however, one of the less studied and well-theorized subjects is the topic of urban energy systems. We define these systems as interlinked networks of formal and informal institutions (including energy markets and regulatory systems), technologies, and stakeholders that influence policies, technology decisions and supply and demand choices for different forms of energy within a city or urban region.

By examining local energy systems we gain insights into a specific city, as well as a broader understanding of how cities generically approach energy use and policy. Particularly when considering the more prominent role that cities are taking in the global climate change debate (United Cities and Local Governments et al., 2008), it is important to understand whether cities can successfully craft and implement policies and programs aimed at influencing local energy use, or whether this is largely rhetoric.

Answering these questions requires research into the various stakeholders, policies, and other institutions involved in energy decisions in a city. It requires a review of the historical record, the city's technology path, and initiatives focused on the future. Of particular interest to us is the city's 'capacity to act', or capability to form and implement policy and programs on different matters. Characterized by others as local rights and competences (Wilson and Game, 1998) or jurisdictional capacity (DeAngelo and Harvey, 1998), questioning a city's capacity to act means we seek to understand whether the local authority has broad policy development and implementation powers, or whether these powers are narrowly defined or constrained.

It is impossible to speak generically about a municipality's capacity to act, because each city reflects dramatically different circumstances, a function of their position as "creatures of the state" (Grumm and Murphy, 1974). In other words, with very few exceptions, the key attributes of a local authority – its institutional structures, its responsibilities, and its powers of taxation – are all derived from state or national government allocations of authority. In the UK, for instance, local authorities are governed by the legal principle of *ultra vires*, which specifically states what rights and responsibilities are assigned to them (Wilson and Game, 1998). In the United States, 'Dillon's rule' – a federal appeals court decision – is widely considered to be the guiding doctrine explicating the subservient policymaking powers cities enjoy in comparison to state or federal government (Grumm and Murphy, 1974).

This is particularly important to understand when seeking to explain why policy proposals read as they do, why a local authority's implementation efforts are structured a certain way, or why they succeed or fail. This type of analysis is also helpful in assessing local capacity in relation to other tiers of government and private sector and non-governmental organization stakeholders. Finally, this analysis ideally allows us to compare the capacity to act of different cities, helping us understand why cities pursue different strategies or attain different implementation outcomes.

II. URBAN ENERGY SYSTEM STUDIES

There are many books and studies that have been written over the years analyzing one or more components of the energy system in different cities. Hughes' widely admired history documenting electricity system development in Chicago, Berlin, and London shows how differently the storyline played out in different countries (Hughes, 1983). Other books highlight the raucous politics and larger-than-life actors central to a specific city's story (Platt, 1991), or track the history of the utility dominating gas and electric distribution in a city (Lurkis, 1982). Some read like a novel, while others are highly technical white papers explaining why it will be difficult to break away from a long embedded energy path.

Policymakers and advocates have contributed to the literature on urban energy via studies documenting deficiencies or opportunities in one or more policy silos that tend to make up a city's energy system. [See Box 1] These studies often tend to be forward thinking, illuminating alternative visions of where the city might head in the future (For example, see New York City Energy Policy Task Force, 2004, Greater London Authority, 2004, San Francisco Department of the Environment and San Francisco Public Utilities Commission, 2002).

Box 1: Policy silos integral to urban energy system analysis

- Electricity supply, distribution and use
- Land use planning
- Transportation
- District energy and on-site thermal energy
- Building design and codes
- Waste and other forms of embodied energy
- Water delivery and treatment
- Energy-related economic development
- General energy governance practices

The core factors or values under girding these analyses are quite varied, reflecting city-specific concerns or technology-specific externalities. It is possible, however, to categorize them into four broad typologies.[1] [See Table 1] It is not uncommon for a narrowly cast policy silo study to touch on elements of several of these typologies, although in other cases these analyses are more homogenous in their orientation.

[1] Fossil fuels came to dominate the fuel supply in cities by the mid-1800s, and these typologies generally reflect trends in the literature and overall energy policy making activities since then. It may be the case that there are additional factors we would identify if we adopted a longer time horizon.

Table 1: Energy System Study Typologies

Key factors under girding energy system analysis	Types of issues/concerns examined
Economic	Focus on how energy influences the local economy or individual household budgets. Issues commonly discussed include security of the local energy supply, cost-containment, consumer protection, job creation/retention, and a city's environmental reputation.
Public health	Focus on how energy use or fuel types affect local, regional, or global public health. Issues commonly discussed include elimination/reduction of health impacts associated with local energy use or the acquisition of energy resources used locally.
System mechanics	Focus on core functioning of the local or regional energy system, including supply chain logistics, the technical systems producing or distributing energy in a city, or behavioral or climatological drivers of energy use in the city.
Environmental protection	Focus on non-health related aesthetic or ecosystem impacts associated with local energy use or the acquisition of energy resources used locally.

Different factors have dominated local energy policy debates at different points in time. In the early days of electric and gas market development in cities – roughly the 1840s to the 1920s – system mechanics issues were a primary driver of local policy analyses. The problems were directly attributable to the new and rapidly evolving energy technologies being deployed around cities, and local authorities grappled with pricing, competition, and technological compatibility issues (Hughes, 1983). Economic concerns also arose in the wake of this rapid technology deployment, resulting in efforts to enhance oversight of the industry. A century later, regulatory concerns were again preeminent, as efforts to restructure the energy marketplace led to changes that adversely affected local operations and prices (Benson, 2002).

Of all the topics, however, public health and environmental protection factors have had perhaps the longest and most enduring influence over urban energy system policymaking. Almost from the dawn of fossil fuel use in cities, concerns have arisen over the localized emissions associated with certain fuels. Efforts to regulate London's famous 'pea soup' fog in the 1800s and again in the 1950s presaged efforts to reduce smog levels in US cities in the 1970s. Most recently, global environmental concerns – namely climate change – have come to dominate the urban energy policy agenda.

The focus on global climate change has led to an entirely new set of urban energy literature that focuses on the specific steps cities should take to reduce local greenhouse gas emissions (and by extension, local energy use) (Hubbard and Fong, 1995, Lerch, 2007, US Conference of Mayors, 2007). A common element of these analyses is the measurement of local energy use and greenhouse gas emissions. Several alternative accounting methods have been developed thus far, including those measuring urban 'metabolism' (Alberti, 1996), urban 'footprints' (Rees, 2000) and more straightforward energy input/GHG emission output models (ICLEI, 2009).

Many of the local energy plans we see today – often called climate or sustainability action plans – follow the formula of identifying an overall GHG emissions reduction

target and a set of policies or programs designed to deliver these changes. Some plans are narrowly cast, focusing solely on what city government can do to reduce energy use and/or emissions from its own operations (Parshall, 2001). Other plans adopt a broader approach, seeking to influence energy use/emissions from households and businesses across a city (For example, see City of Seattle, 2006, Greater London Authority, 2007, Tokyo Metropolitan Government, 2007, City of New York, 2007)

The individual strategies elucidated in these plans tend to fall into the same policy silo categories identified above in Box 1, although there is more emphasis on holistic approaches emphasizing the interconnectedness between different silo-specific strategies. For example, waste policy initiatives have historically been narrowly viewed as an aesthetic or public health matter, but they can also be linked to a city's energy policy through a more strategic viewing of selected waste streams as potential fuel sources. Waste collection methods can also tie into a local energy strategy in that collection vehicles can use clean fuels (i.e. natural gas or biofuels), while transport to distant disposal facilities can occur via highly energy-efficient rail or barge systems. Policy interconnections of this type generally hold value because they force stakeholders to look past their normal, narrow policy remit.

III. ALTERNATIVE METHODOLOGICAL APPROACHES FOR ASSESSING CAPACITY TO ACT

There are several analytic frameworks we might apply to understand energy policy decision-making and behavior in a city. Because the local energy 'system' reflects technological, resource and market realities, rules and regulations, and stakeholders in and out of government, the key is in employing a flexible approach that helps us divine the core influences on behavior.

In the past, the traditional choices for analyzing decision-making at the local level would have involved theories of pluralism, corporatism, and urban elites, ultimately focusing on assessing which individuals or groups have the power to govern (Hall and Hubbard, 1996, Stoker, 1998). Knowing this helps us divine the 'logic' of local energy planning. However, in an era where governance is the central means of local action, these models prove too narrow, unable to address the fact that no single group is likely to dominate the policy development or implementation process (Stoker, 1998). More robust models are therefore required to untangle the complexities of local policy networks and to understand the fragmentation of institutions, the capacities of various stakeholders, and the values that drive them (Pierre, 1999, Newman and Thornley, 1997, de Magalhaes et al., 2002). Today, new institutionalism is regularly cited as an approach well suited to dissecting urban governance systems (Rhodes, 1997, Pierre, 1999, Newman and Thornley, 1997, MacLeod and Goodwin, 1999, Harding, 2000).

Even new institutionalism falls short as an analytic tool, however, because little work has been done to develop a methodological framework guiding the analysis. Researchers compile information and ultimately draw conclusions based on their analysis of the facts, but there is no formulaic approach that allows us to quantify the potency of local policies

and programs in a consistent way. This is particularly problematic when we seek to compare one city to another, or when we aggregate cities together to ascertain their collective potential to influence energy use or greenhouse gas emissions.

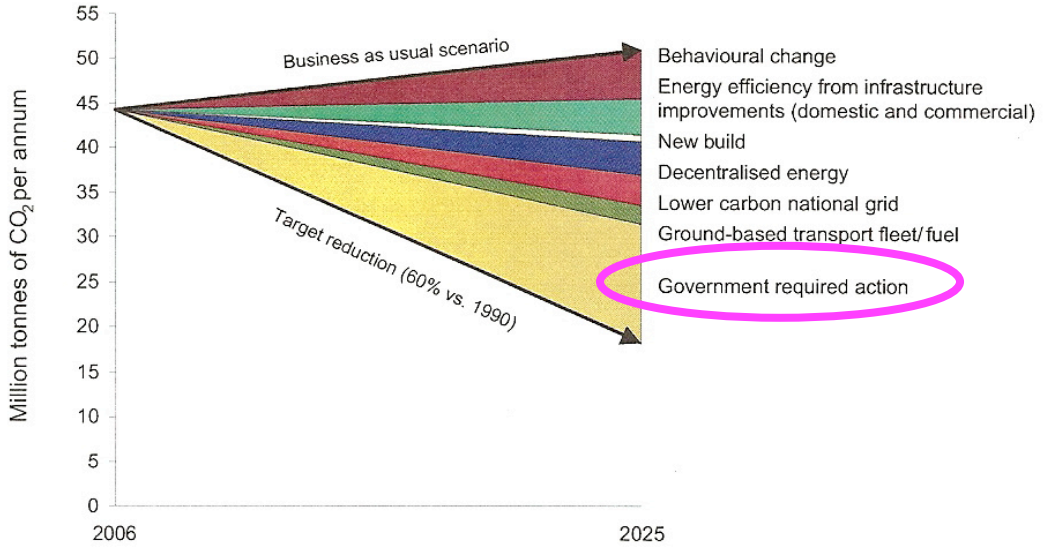
3.1 Assessing Capacity to Act – A Quantitative Approach

Assessing capacity to act can be challenging, although it has been done. The Greater London Authority (GLA) has assigned policymaking or implementation responsibility for different initiatives proposed in its climate action plan that it hopes will reduce citywide greenhouse gas emissions by 60% by 2025 compared to a baseline year. The plan specifically notes that local policy powers – those directly in the hands of the local authority – are capable of delivering a mere fraction of the total target (Greater London Authority, 2007):

> Under all scenarios considered in this action plan, the Mayor and the [Greater London Authority] alone cannot deliver more than 15% of the necessary reductions. Responsibility for tackling climate change must be shared between the mayor, the London boroughs (5-10 per cent of requirement), London's companies and public sector organizations (35-40 per cent), Londoners (5-10 per cent) and national government (30 per cent).

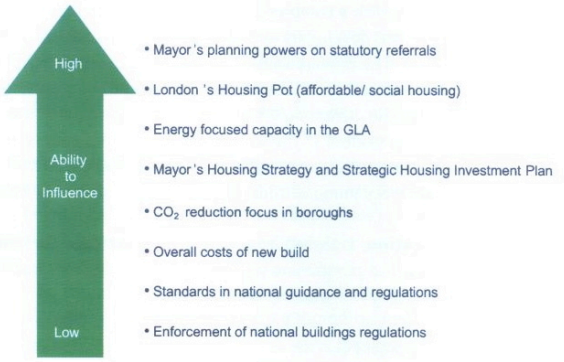
The London Climate Change Action Plan amplified this point through the use of a wedge analysis that detailed how effective different strategies would be at delivering emission reductions compared to a 'business as usual' greenhouse gas emissions trend line. The analysis clearly acknowledges the sizable proportion of the emission target that could only be delivered through central government action. [See bottom wedge in Figure 1]

Figure 1: Wedge Analysis of London GHG Emission Reduction Strategies
(Greater London Authority, 2004)



Part of the GLA's calculus comes from an in-house assessment of where the mayor has significant policy control, and where these powers are weaker. For instance, looking at the GLA's ability to influence the emissions associated with buildings around London, the mayor's team developed an influence 'hierarchy' examining different strategies that could potentially affect buildings-related emissions, and the mayor's influence over these issues. [See Figure 2] Many of the GLA's proposals tee off from this analysis, specifically tying the choice of policy instrument to the mayor's capacity to act. In those areas where mayoral control is low, policy proposals reflect this condition, emphasizing partnerships with Local Authorities around London and the use of exhortatory language (e.g., 'boroughs should…' or "boroughs are encouraged…') to promote attainment of its goals (Greater London Authority, 2004). In areas where mayoral capacity is high, the mayor tends to impose more mandates.

Figure 2: London Policy Influence Hierarchy
(Greater London Authority, 2007)



The GLA's estimate of its influence was essentially made using the following mathematical formula:

$$CTA = \sum ((C_1 \times S_{1)} + (C_2 \times S_2) + \ldots + (C_i \times S_i))$$

where a city's capacity to act (CTA) is the sum of the city's ability to influence the level of energy use or carbon emissions (C_i) in various policy silos multiplied by the relative contribution of each silo to the city's overall energy use or emissions profile (S_i).

This exacting approach has the virtue of providing a consistent framework for use in any city, but it suffers from three principle flaws.

First, it is predicated upon an accurate accounting of energy use or carbon emissions in a city. Several analyses have found that these inventories can vary significantly, due to boundary, data access, and data quality issues (International Energy Agency, 2008, Parshall et al., in review).

Second, C_i involves a relatively arbitrary assessment of what a city may accomplish in terms of affecting local energy use or carbon emissions. Because sustainability plans are

prospective, covering a long timeframe, forecasts inherently hold great uncertainty. Local authorities may reasonably assume they will attain outcomes similar to those documented in other cities, but the transferability of ideas will hinge on local market conditions, consumer elasticity of demand, and other location-specific factors that may be difficult to ascertain.

Third, the scope of energy and climate plans varies widely across cities. That is, one city's plan may cover all of the silos listed above in Box 1 while another may only target half of them. Particularly when making comparisons across cities, researchers must take care to ensure that the analysis captures the fullest portrait possible in each city, producing an apples-to-apples analysis.

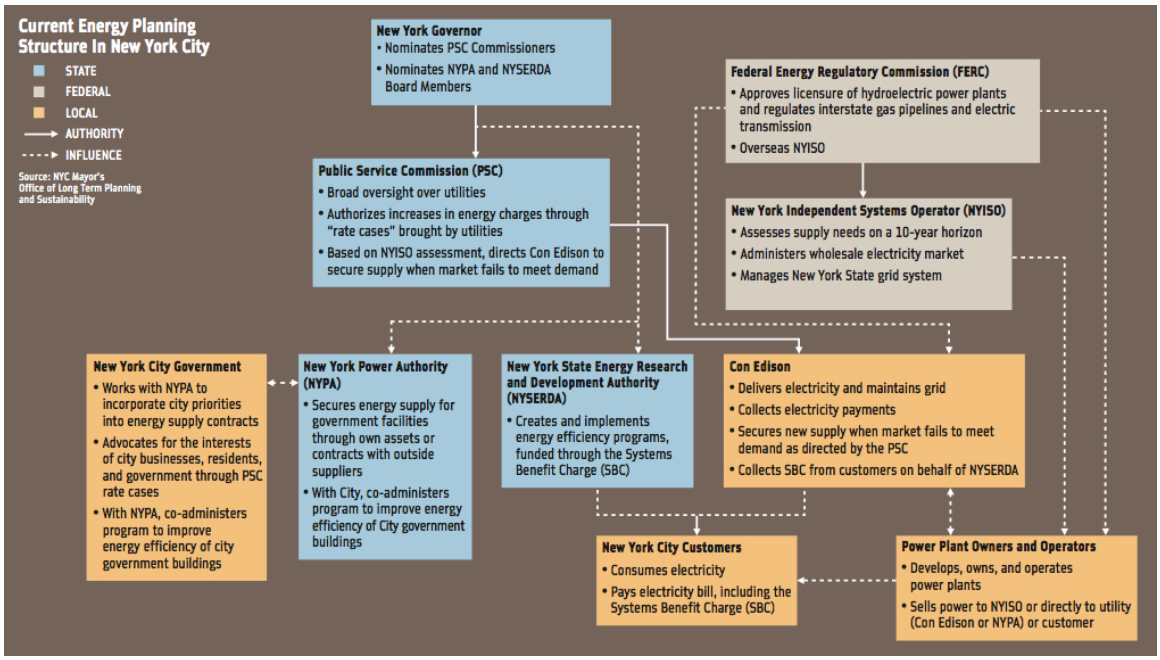
3.2 Assessing Capacity to Act – A Qualitative Approach

New York City's long-term growth and sustainability plan, known as PlaNYC, lacks a quantitative assessment of the extent or limits of mayoral control, but it is similarly focused on the local authority's lack of direct control powers in several key policy areas. For example, after noting the many diverse energy challenges facing the city, the report states:

> There are eight organizations responsible for some dimension of energy planning in New York City, but not one of them is designed to take the city's unique needs into account. None are empowered to bargain on behalf of New Yorkers, while prioritizing air quality, lowering global-warming emissions, and ensuring affordable prices. And there is no existing planning body that analyzes how supply and demand-side strategies can work together to achieve reliable power for the city (City of New York, 2007).

The PlaNYC report then maps the allocation of responsibilities among different stakeholders, indicating which have direct authority or indirect influence over others. [See Figure 3]

Figure 3: Map of Current Energy Planning Structure in New York City
(City of New York, 2007)



New York City Mayor Michael Bloomberg uses these facts to promote the establishment of a new Energy Planning Board that would both raise the level of policymaker attention focused on New York City energy security issues and enhance City Hall's influence over this process (City of New York, 2007).

A variation on this qualitative mapping exercise is proposed by Hammer (2008), who asserts that cities should view their situation through the prism of standardized policy levers or service functions common to all cities. Energie-Cités (2006), a European non-governmental organization that provides technical assistance to local authorities on energy and climate matters, argues there are ten types of activities that local authorities engage in that can serve as framing devices for this discussion. [See Box 2]

Box 2: Energie-Cités characterization of key local authority policy and programmatic responsibilities

-- Service provider	-- Consumer
-- Model	-- Planner
-- Developer	-- Regulator
-- Advisor	-- Motivator
-- Producer	-- Supplier

Source: Energie-Cites 2006

In general, we believe such a breakdown is overly specific, and in fact misses several key functions that government typically fulfills. We therefore posit there are five broad categories of mayoral policy and program levers. These levers can be targeted internally, towards local government operations, facilities and staff; or externally, targeting the general public, the private sector, or other stakeholders in a position to act in ways beneficial to the local authority's needs or interests.

The five key sets of mayoral levers include:

- *Rulemaking*. Local authorities hold several types of regulatory powers, such as the ability to establish land use controls that influence transport-related energy use (Owens, 1986). Cities may also exploit the administrative process implementing these rules to promote certain types of energy technology use or consumption behavior. Regulatory functions may extend to public health or environmental protection concerns, with local authorities establishing standards to ensure that local energy system assets are operated safely and with regards to local quality of life concerns. (Local authorities operating municipally-owned electric and gas utilities are perhaps best positioned to do this, as privately owned-utilities are generally only answerable to regulators operating at the state, provincial, or national level.)

- *Regulatory oversight:* a related but different set of responsibilities link to the local authority's role enforcing standards set by other governmental entities. Examples include building codes[2] or power plant and vehicle emission standards established by state or federal authorities.

- *Direct expenditures/Procurement:* Local authorities are big consumers of goods and services, and the energy bill for local government operations can be quite high, particularly in large cities. For example, the City of New York spends approximately $800 million each year on all types of energy to support its operations (City of New York, 2007). Local governments can require their energy providers to supply electricity from certain fuel sources, just as it can buy certain types of fuels for its vehicle fleet. In some cases, the massive amounts of energy consumed by local government can provide the critical mass to move new energy projects forward, or it can be aggregated with the energy demand of local consumers to help command more competitive prices (Hammer, 2008).

  Local authorities may also make direct investments in facilities and technology designed to serve the public in a more energy efficient manner or promote energy efficient behavior. Local authority investments in public transport are an obvious example, as are investments in LED streetlamps or lighting upgrades in public buildings.

- *Financial incentives*: Local authorities commonly provide tax breaks or direct financial support to promote energy efficient behavior. For example, the Los Angeles Department of Water and Power (2009) provides cash subsidies to homeowners installing solar panels on their rooftops, while the city of San Diego allows real estate developers to employ a faster (and thus less costly) construction permitting process if they construct 'green' buildings hosting solar PV systems (City of San Diego, 2007). Congestion pricing schemes are examples of financial incentives being targeted at individual drivers to promote reduced vehicular use in certain sections of the city (Richardson and Chang-Hee, 2008).

[2] In some areas, local authorities have the right to establish building codes separate from those developed by the state or central government. In this case, these powers would more appropriately fit above under the rulemaking category.

- *Information gathering and dissemination, convening/facilitation, and advocacy* -- Mayors have a highly visibly public platform from which to speak out on energy issues. These efforts can range from simple information dissemination about energy/climate concerns, to more targeted efforts aimed at ensuring that specific populations or business sectors are aware of certain energy subsidies or services. Mayors are also expected to play an advocacy role on behalf of their constituents, speaking up for the energy needs or interests of the community before state or national level authorities. All of these roles involve the strategic use of information to further the interests of the city.

  A closely related role involves a local authority's use of its convening powers to achieve certain end goals. In the energy/climate arena, this can involve working with local stakeholders to aggregate information about greenhouse gas emissions from a number of businesses to gain eligibility for participation in carbon markets, or helping energy businesses access the necessary state or central government operating approvals.

Hammer (2008) argues that such categories provide a helpful framing device for cities seeking to craft comprehensive energy strategies by clarifying both opportunities and limitations in the city's capacity to act. By listing these instruments on one axis and all relevant stakeholders (e.g., the local authority, city/provincial/regional officials, central government, the private sector, households and NGOs) on a second axis, the Capacity to Act Matrix (CTAM) makes clear the local authority's policy and program powers. Within each box, key facts about energy policies, programs and services are noted that are relevant to each stakeholder.

Table 2: Capacity to Act Matrix (CTAM) Analytic Framework

	Key Stakeholders					
Type of Mayoral lever	***Local authority***	***Provincial/state government***	***Central government***	***Private sector***	***Households/ individuals***	***NGOs etc.***
Rulemaking	....	....	....			
Regulatory oversight	....					
Direct expenditures/ procurement	....	....	....	....	.....	
Financial incentives		....	....			
Information gathering and dissemination, convening/ facilitation, and advocacy	....	....	....	.....		.....

Local authorities seeking to develop a comprehensive energy strategy may find it beneficial to take this analysis one step further, developing a capacity to act inventory that examines *each* of the policy silos specified above in Box 1, broken out by each energy-consuming sector (e.g., residential, commercial/institutional, industrial, and

government). Although this can be a time consuming process, it makes sense for local officials to fully understand what policy weapons are in their arsenal and when strategic alliances with more powerful partners are necessary.

This technique is less helpful when comparing capacity to act across cities because of the detailed local knowledge required to complete the matrix.

3.3 Assessing Capacity to Act – A Linguistic Approach

A third approach seeks to impute information about a city's capacity to act through a simple numerical accounting and plotting of the types of levers employed by a city in its energy or climate plan. That is, it is a relatively straightforward matter to examine the terminology employed in individual policy or program proposals contained in a local authority's plan and categorize each by the type of mayoral lever that it represents.

For example, the statement "The City [of San Francisco] should seek revisions to state law or regulations to allow it to serve residential and business [electric] load in San Francisco" (San Francisco Department of the Environment and San Francisco Public Utilities Commission, 2002) is clearly an advocacy-type statement, expressing aspirations about a matter over which the city currently has no capacity to act. By contrast, the statement "The Paris City Council is committed to pursuing its efforts … [by] purchasing low-emission vehicles" (Marie de Paris, 2007) shows a willingness to take action via direct expenditure.

By categorizing each policy or program recommendation and plotting it on a 'radar' diagram, we achieve a visual portrait of a city's preferred policy approach. As a summary device, this method is intuitively easy to grasp, but it gives short shrift to the complex circumstances under girding the city's approach. It may also fail to distinguish differences across policy silos. There may be much that can be learned, for example, by preparing a radar plot for each separate policy silo. For example, Figure 4 tracks the transport and energy-sector policy proposals contained in PlaNYC, New York City's long-term growth and sustainability plan.

Figure 4: Radar Plot of PlaNYC Energy and Transport Sector Policy Proposals

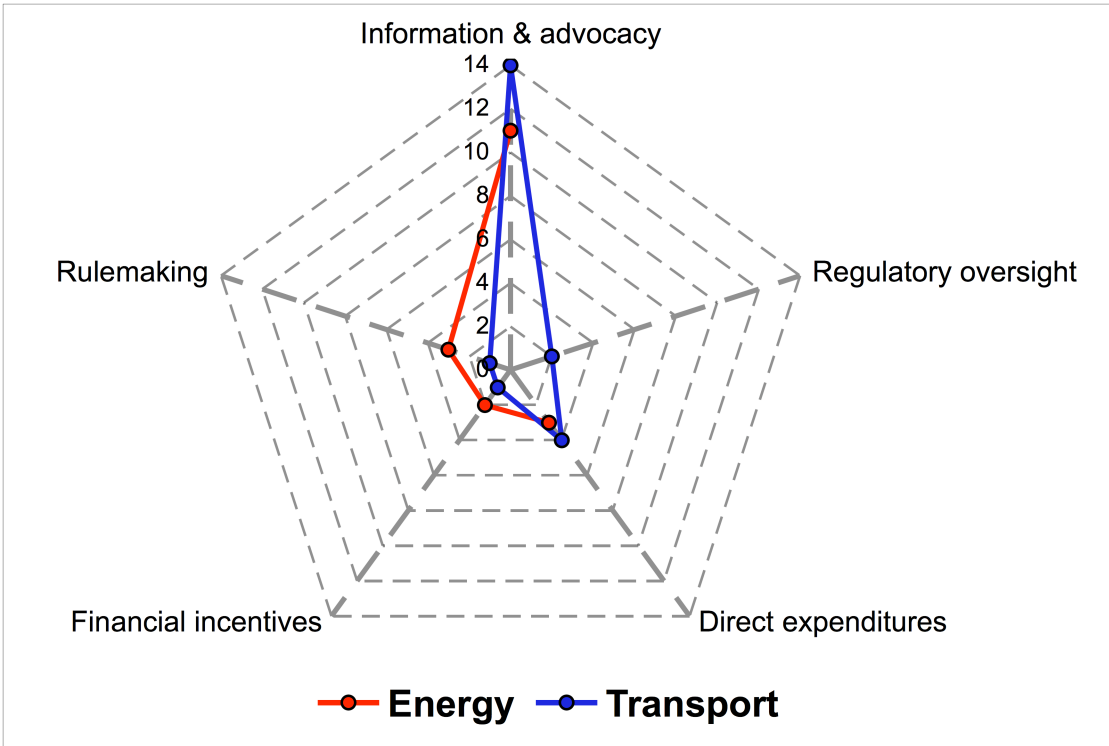


Figure 4 makes clear that – at least in these two silos – PlaNYC largely relies on information and advocacy-based policy approaches. There are relatively few instances where the mayor seeks to impose some type of mandate or financial incentive to change behavior. Time and again the report notes how the city's hands are tied and how the situation would improve if others took action in support of the PlaNYC goals. For example, one initiative proposed by the mayor is the development of special traffic lanes dedicated to bus rapid transit vehicles. To ensure only buses use these lanes, cameras would be installed taking photographs of other vehicles traveling in these lanes. Only the state legislature has the ability to sanction such camera use, however, so the mayor makes clear his intent to "seek the approval of the state legislature to use cameras to issue fines to drivers who violate the lanes" (City of New York, 2007). [A complete breakdown of PlaNYC's energy and transport strategies can be found in Appendix A.]

The real value of the radar plot approach is its overall simplicity, its ability to quickly display general trends, and how it facilitates comparisons with other cities. National comparisons are possible as well, if such analyses are completed for a sufficient number of cities.

There are several weaknesses to this approach, however. First, it weights all policies measures equally, so on the radar plot, a proposal committing to a $10 million program appears equivalent to a proposal committing to a $10,000 expenditure. This could be addressed by utilizing an alternative methodology that weights each policy prescription

by its anticipated impact or economic value, much like the first capacity to act assessment method described above, but this adds considerable complexity to the model.

Second, this approach may capture policy *preferences* rather than a city's true capacity to act. A mayor may be ideologically predisposed to prefer market-based financial incentives to regulation, despite the fact that he or she has regulatory control powers. The radar plot will not capture the distinction.

Finally, the language used in a city's energy or climate plan may be deliberately ambiguous to give local policymakers flexibility in terms of implementation. This introduces challenges in interpretation, as researchers may read the same policy proposal differently based on their level of familiarity with a mayor's past record of action. To the extent researchers clearly articulate and use common evaluation protocols, this problem may be minimized.

IV. CONCLUSION

In recent years, cities around the world have garnered attention for their policy efforts on energy and climate matters (International Energy Agency, 2008). These plans seek to devise a path towards more sustainable energy use and other goals of importance to local stakeholders. A key question is whether cities can deliver on this vision. As "creatures of the state" (Grumm and Murphy, 1974), cities excel at certain types of policymaking powers but have rigid limits in other areas. Capacity to act analyses, built on a new institutionalist theoretical foundation, help us investigate this situation more closely, but to date, little work has been done to offer guidance on how these analyses should proceed. In this paper, we propose three alternative methodological approaches, each of which involves different degrees of complexity and effectiveness.

The purpose of the analysis will largely dictate which approach is most appropriate. For local authorities seeking to craft a maximally effective energy or climate action plan, the CTAM approach, which details local policymaking competencies in an exhaustive way, appears to offer the greatest potential. The CTAM approach organizes information by the different policy levers available to a mayor, contrasting local capacity with that of other key stakeholders. This ensures that a local authority obtains the clearest possible portrait of when it can act autonomously, when it must act in concert with others, and when others must take action on the city's behalf.

For local authorities seeking to build an argument for action by other stakeholders, or justify some type of devolution of authority from state/provincial or central government to the local authority, all three assessment approaches make the case for change. The CTAM again stands out because it explicitly defines ways that others can take action benefiting the city.

From a research perspective, the quantitative approach and the CTAM framework are of greatest use when applied to a limited number of cities. As more cities are included in the analysis, the more costly and time-consuming the research becomes. That is when the

virtues of the linguistic model become more obvious, given its relative ease of use. The model has flaws that cannot be ignored, but its ability to serve as a quick proxy for a city's capacity to act means comparisons can easily be drawn across many cities or across nations.

In the run-up to the Copenhagen climate summit in December 2009, much ado has been made about the role cities should plan any new climate agreement (United Cities and Local Governments et al., 2008). Understanding how cities can realistically contribute towards efforts to mitigate climate change is imperative, making it critical that capacity to act issues be explored in a meaningful way. The approaches presented here represent a useful starting point on this path.

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Appendix 1
PlaNYC Energy and Transport Policy Proposals Categorized by Mayoral Lever

Energy Strategies

Type of Mayoral Policy Lever(s)	Proposal
Information/ facilitation	1. Establish an Energy Planning Board
Direct expenditure	2. Reduce energy consumption by city government
Rulemaking	3. Strengthen energy and building codes in New York City
Advocacy	4. Create an energy efficiency authority for New York City
Rulemaking Financial incentive Advocacy	5. Prioritize five key areas for targeted incentives
Advocacy Direct expenditure	6. Expand peak load management
Education	7. Launch an energy awareness and training campaign
Advocacy	8. Facilitate repowering and construct power plants and dedicated transmission lines
Advocacy/facilitation	9. Expand clean distributed generation
Advocacy	10. Support expansion of natural gas infrastructure
Financial incentive Direct expenditure Advocacy	11. Foster the market for renewable energy
Advocacy	12. Accelerate reliability improvements to the city's grid
Advocacy Rulemaking	13. Facilitate grid repairs through improved coordination and joint bidding
Advocacy	14. Support Con Edison's efforts to modernize the grid

Transport strategies

Type of Mayoral Policy Lever(s)	Proposal
Advocacy	1. Increase capacity on key congested routes
Advocacy	2. Provide new commuter access to Manhattan
Advocacy	3. Expand transit access to underserved areas
Advocacy Direct expenditure Rulemaking	4. Improve and expand bus services
Advocacy	5. Improve local commuter rail service
Direct expenditure	6. Improve access to existing transit
Information	7. Address congested areas around city
Advocacy	8. Expand ferry service

Education Regulatory oversight Direct expenditure	9. Promote cycling
Advocacy Financial incentive	10. Pilot congestion pricing
Direct expenditure	11. Manage roads more effectively
Advocacy Direct expenditure	12. Strengthen enforcement of traffic violations
Rulemaking Information	13. Facilitate freight movements
Advocacy	14. Close MTA's state of good repair gap
Advocacy	15. Reach a state of good repair on city's roads and bridges
Advocacy	16. Establish a new regional transit financing authority