

Institutional Arrangement and Policy Context Underlying Sustainability Actions in the U.S.: Lessons for Asian Regions

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This paper examines the actions and the factors driving those actions to reduce energy consumption and enhance energy efficiency taken by United States cities. While not much empirical evidence is available on why governments pursue practical sustainability actions, we attempt to shed more light on this important topic by empirically identifying factors that contribute to concrete actions toward sustainability policies. We adopt political market theory as a basic theoretical framework with policy-making applied to city energy consumption. Using the 2010 ICMA (local government sustainability policies and program) data, this study expands the focus of analyses to evaluate the effect of the form of government on energy consumption and energy efficiency by using multiple regression analysis. The findings show that at the city level, the mayor-council form of government are negatively associated with governments' efforts to reduce energy consumption. However, cities with at-large elections and municipal ownership are more likely to adopt sustainability actions. We also find that a large-scale economy has significant effects on the effort to reduce city energy consumption and improve energy efficiency. This shows that environmental policies are directly connected to locally relevant affairs, including housing, energy use, green transportation, and water. Thus, local level administrators could take an executive role to protect the environment, encourage the development of alternative energy, and reduce the use of fossil fuel and coal energy. These efforts can lead to important environmental ramifications and relevant actions by municipal governments.

Keywords: sustainability, form of government, energy policy, political market framework

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Introduction

Over the decades, there has been increasing concern about sustainability and sustainable development. The International City/County Management Association (ICMA) defines sustainability as “central to the professional management of local government, with four interdependent elements: balancing environmental stewardship, economic development, social equity, and financial equity and validity” (ICMA, 2007, p. 2). Sustainable development is noted by the United Nations as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, Khalid, Agnelli, Al-Athel, & Chidzero, 1987, p. 6). In the same vein, the ICMA addresses it as “development that improves quality of life, making a place more livable without harming the environment or creating financial burdens for future residents (ICMA, 2007, p. 1)”. As Al Gore mentioned in his dissertation in 1993, the rescue of the environment should be the main interest at the core of organizing principles for civilization (Fiorino, 2010, p. 578; Wang, Hawkins, Lebrede, & Berman, 2012; Krause, Feiock, & Hawkins, 2014). Sustainable development will meet not only the needs of the current generation but the needs of future generations (Whitehead, 2012; Portney, 2015).

From this point of view, the classical sustainable system refers to “economic, environmental, and political/social systems (Fiorino, 2010)”. As climate change is considered a political issue and the price of fossil fuels fluctuates, it is evident that efforts to enhance sustainability have become more significant in local governments in America. Moreover, the ICMA (2010) has shown that environmental stewardship and economic development can co-exist and not always oppose each other. This involves a series of changes in the exploitation of resources, the direction of investments, and the pattern of resource use and institutional change in the long term (Wheeler & Beatley, 2004; Zeemering, 2009). Thus, the purpose of economic development is now shifting from quantity to quality in growth and from endless growth to balancing economic growth, social equity, and environmental protection (Portney, 2003; Zeemering, 2009; Raworth, 2017).

As sustainable development is one of the biggest global issues, it is pursued extensively at all levels of governments. Governments attempt in particular to decrease the negative environmental impact of new development, encourage energy efficiency, and develop renewable energy. They are involved in regulating or providing patterns of land use, transportation, recycling, and energy use and in reducing greenhouse gas. Thus, governments have much responsibility for mitigating climate change and enhancing sustainability.

Although some levels of government perceive sustainability as a global issue, the pursuit of sustainable development at the city level in the United States is extensively viable. In Europe, making decisions about sustainability issues involves a lot of complex socio-political matters. Government capacities and governance arrangements are important are the key variables in sustainability policy decision (Weiland, 2010). Public and stakeholder participation is also important to in dealing with sustainability issues (Garmendia & Stagl, 2010). Compared to Europe, United States has a relatively non-green/non-eco-friendly context. Svava, Watt, and Jang (2013) state that “although its environmental impact is admittedly substantial, the United States has not signed on to any international agreement to reduce its footprint. In the absence of leadership at the

national level, cities have emerged as both innovators pursuing broadly based environmental goals and efficient utilizers of the reduced resources available to them as they seek to decrease their own energy consumption” (p. 10). The quantity of fossil fuels and coal are known to be finite and the price of energy resources is fluctuating, so cities could try to control energy consumption as a first step in achieving sustainability. This could also meet the primary needs of local governments broadly pursuing economic development and environmental stewardship. Efforts to reduce energy consumption not only mean constraining the use of energy but also increasing energy efficiency and developing alternative energy sources. More specifically, these actions at the city level might prove explicitly tangible and clearly show the cost-saving benefits of alternative technologies such as electric cars, upgraded or retrofitted gadgets, solar panels, and geo-thermal systems.

This study examines the factors driving actions to decrease cities’ use of energy and improve energy efficiency. We will identify and explain the reasons for their taking these actions. Previous sustainability-related studies generally focus on a blueprint of policy plans. That is, regarding green policy adoption, they discuss climate action programs or general future plans. These are environmentally friendly, but there is still a lack of interest in the studies, which are related to more specific and practical action, such as an agreement on reducing cities’ carbon footprint, regarded as a first step for green sustainability or smart growth. Although governments put their effort into adopting visible programs, they could start with practical and concrete actions such as raising energy efficiency and reducing city energy consumption as a way of protecting the environment. For instance, cities adopting sustainable programs might not take action, just using those policies as a slogan (Marcuse, 1998). Moreover, we often cannot tell whether or not they are really putting sustainable policies into practice. Thus, it could be meaningful to investigate whether or not governments practically take action to reduce city energy consumption and improve energy efficiency in a narrower but concrete scope. We could also investigate what factors drive governments to make practical effort. The procedure used for this research will be as follows: First, we will discuss the reasons why pursuing sustainability at the city level is important to be examined. Second, political market theory and decision-making applied to city energy consumption will be used as a theoretical framework. Then, we will investigate the factors affecting action on energy consumption and efficiency by using multiple regression analysis. Last, we will draw a conclusion from the findings and provide implications for this research.

Why Should Pursuing Sustainability Be Considered at the City Level?

Climate change has become a global concern and the term sustainability has emerged with the effort to improve both social and environmental conditions alongside economic growth. Over the past few decades, the landscape of environmentalism in the United States has shifted considerably from national and state policies “to efforts designed to shape the contours of the biophysical environment in smaller geographic areas” (Portney, 2005, p. 579). Although the assertion that small geographic regions are effective in pursuing the preservation and advancement of the

environment is relatively new, it makes sense regarding the scope. When interest in sustainability arose in the 1960s, environmental attention moved to the federal level because it was thought that the local level was ill-suited for managing sustainability issues, which were beyond its compass (Portney, 2005). The monetary burden of protecting the environment overwhelmed the local government's capacity; the scale of environmental problems made municipalities ignore the issue. However, since the 1980s, local governments have steadily recognized their potential role to protect the environment with economic development expansion.

At the city level, policies are directly connected to locally relevant affairs including housing, energy use, green transportation, and water (Portney, Watt, & Jang, 2013). Given that, focus has shifted to the local level taking an executive role in reviving the environment, encouraging the development of alternative energy, and reducing the use of fossil fuel and coal energy (Feiock et al., 2017). These efforts can lead to important environmental ramifications.

Political Market Framework and City Energy Consumption

As private choice derives from economic agencies, public choice is often oriented by political institutions. However, the choice mechanism is quite different from the private sector, which is primarily driven by price, because government has to consider both efficiency and accountability. Administrative operations run under a number of constraints. Difficulties reaching policy agreement, implementation problems, and interests of stakeholders such as legislators, bureaucrats, and other relevant actors should be considered. Factors such as voting, authority, and legislation are inherent characteristics relevant to political institutions. Sometimes the category of stakeholders overlaps, and the political process can be quite complicated (Campos & Reich, 2019). In the academic field, for two decades, new institutional theories have been developed from a perspective of rational choice, focusing on economic-oriented aspects of decision-making in many institutions. Moe (1990) emphasizes the innate and unique nature of politics that we consider when we examine and analyze policy adoption and decision-making.

Literature on the political market framework explains how governmental actions are shaped by “the profile of the mayors and local government executives on the supply side” (Tavares & Cruz, 2017, p.3) and the preferences and interests of local organizations on the demand side (Keohane, Revesz, & Stavins, 1998; Feiock, Tavares, & Lubell, 2008; Tavares & Cruz, 2017). Interest groups, such as affected firms, advocacy organizations, and citizen groups, which are organized for collective actions and capable of participating in decision-making, apply pressure to resource-allocation decisions and policy outcomes (Eggertsson, 1990; Keohane, Revesz, & Stavins, 1998). This demand side is typical for private arrangements, too. However, unlike activities in the private sector, government authority is empowered by its constituents and interest groups. Since politicians and elected administrators are to be more influenced by their constituents, considering voting preferences such as consistency with their ideological beliefs and positions is important (Jackson & Kingdon, 1992). The perception of electoral costs and ideological costs from

the elected executives functions as the supply side and may affect the process of policy formation. Thus, interest group theories of property rights are deficient in fully explaining a political institution, and political market theory supplements the understanding of policy demand, governmental policy creation, and better policy outcomes under differential institutional arrangements (Feiock, 2006).

Environmental resources can be regarded as the commons: even though they are finite you cannot prevent someone from using them. Among others, energy is one of the most essential commons. Therefore, governments should take a key role in managing energy governance because energy policy should meet the needs for equity and stable provision (i.e., equally shared throughout the society). That is why many city governments provide electric or water service rather than the private sector, with ways of in-house or joint contracting, even if the private sector operates it more efficiently. This means that a government has an incentive to deal with energy efficiency as a sole provider or co-agent with other actors; it chooses the method of provision, considering its diverse benefits and constraints. In this sense, the political market framework can be helpful in explaining political dynamics of governments' actions to reduce their energy consumption using a green slogan and a policy of sustainability. The political market framework considers the neglected political side of local governments' policy decisions from economic and sociology literature, which are critical mediators of economic and political forces (Feiock, 2002; Lubell, Feiock, & Ramirez, 2005, 2009).

The Structure of City Executive Institutions.

At the municipal level, administrative and political institutions take a significant role in deciding the rules and procedures for collective decision-making (Clingermayer & Feiock, 2001). Many empirical studies draw conclusions about the different policy outcomes of two different forms of government, namely the mayor-council form or council-manager form (Lineberry & Fowler, 1967; DeSantis & Renner, 1994; Clingermayer & Feiock, 2001; Lubell et al., 2009; Sharp & Daily, 2010; Feiock & Bae, 2011). The boundary of this research is limited to these two dominant forms of government. The council-manager form disputably has been regarded as a crucial innovation in local government for decades. However, the mayor-council form has been situated in conventional wisdom in the public administration field (Carr, 2015).

According to Svava and Nelson (2008) and Carr (2015), the three following features distinguish the mayor-council and council-manager forms: 1) allocation of authority, 2) assignment of executive functions, and 3) accountability of the chief administrators. First, "the unique feature of the council-manager form is interaction of the council members and administrators" (Svava & Nelson, 2008, p. 7). In contrast, the mayor-council form generates a separation of powers so that the mayor can restrict policy authority given to the council and is an independent executive. Second, "in the council manager form, executive functions are the responsibility of the city or county

manager even if some functions on occasion are shared with other officials” (Svara & Nelson, 2008, p. 8). However, in the mayor-council form, although a core coordinating position can be organized—a chief administrative officer (CAO)—the assignments to the CAO are determined by the authority of the mayor (Carr, 2015). Third, regarding the accountability of the CAO, “responsibility to the entire council is an essential characteristic of the council-manager form and helps to ensure both transparency and a focus on the public interest rather than the political interests of a single elected official” (Svara & Nelson, 2008, p. 8). However, a CAO in the mayor-council form likely reflects the mayor’s interests more.

Given the findings of empirical studies on the moderating effects of institutions, some environmental-related policies are more adopted by mayor-council forms of government than council-manager forms (Epstein & O’Halloran, 1999; Clinger Mayer & Feiock, 2001). However, according to Feiock and Francis (2010), efforts toward sustainability, such as local climate protection, are differentiated by the form of government, and mayor-council cities are less responsive to pro-climate policy, which is the opposite result from other studies (Feiock & Francis, 2010; Bae & Feiock, 2013). In general, the council-manager form derives from the progressive reform movement to solve the spoils system problem and is connected with efficiency and anti-corruption. That is, sustainability seeks both development and protection of the environment, but cities with the council-manager system seem to pursue sustainability to a lesser extent than cities with the mayor-council form.

Development is drawn to short-term profit, while pro-environmental policy takes a long time to recover costs and requires hard work to implement. The council form as the most critical factor for structural effects on city policy-making (Frederickson & Johnson, 2001; Frederickson, Johnson, & Wood, 2004; Lubell et al., 2009). Despite the significance of the form-of-government factor, it is still not clear which government form prevalently effects pro-environmental or pro-development policy, and the effort to reduce city energy consumption might overlap in both perspectives of the policies.

Smart growth is considered a response to urban problems (Porter, 2002), and its orientation is related to earlier discussions of sustainability (Tregoning, Agyeman, & Shenot, 2002). It focuses on where development needs to happen and how to preserve natural resources while holding up affordable and equitable (Smart Growth Network, 2002; Hawkins, 2011). The effort invested in saving city energy consumption can be employed when considering the conservation of the environment, development of new green technology, and not wasting energy consumption on limited fossil fuel resources. However, the concept of raising efficiency is more likely to be pursued by council-manager forms of government due to professionalism. Thus, contrasting to the prevalent literature stating that the mayor-council form is more favorable in terms of promoting sustainable policy action, this paper, which is more focused on virtual energy efficiency by governments, hypothesizes the opposite form-of-government effect in terms of demands for sustainability.

H1: Cities with mayor-council forms of government are less likely than council-manager forms to take action to reduce city energy consumption.

The Structure of City Legislative Institutions.

Legislative institutions can formulate the responsiveness of actions to reduce energy consumption or facilitate and motivate the development of alternative energy sources. There are two types of elections: at-large and district-based. According to Maser (1998, p. 542), at-large and district council members have similar policy perspectives in that they have tendencies toward the preferences of median voters. He points out that “the size of council and the balance between ward and at-large seats appear to be adjustable safeguards for securing different degree of responsiveness” (Maser, 1998, p. 549). However, in practice, at-large seats take advantage of economic interests that can allow instrumental political resources inevitably to sweep to victory in a citywide campaign (Lubell, Feiock, & Ramirez, 2009). Also, district-based members strain more to reconcile fragmented city decision-making, compared to at-large members considering the issues affecting a broader range of constituents, and they generally focus on more specific issue-oriented policies, including minority interests (Clingermayer & Feiock, 2001). Thus, the political outcome from a different ratio of at-large seats in city councils would not be negligible.

Regarding energy-saving actions, the effort to promote smart growth is a much broader interest than other specific issues. It does not directly affect the daily economic life of constituents, and the results from policies related to the environment are not as tangible, even though it would be helpful to reduce the cost of administrative operations. The concept of sustainability is more likely to meet a wide range of long-term interests, so at-large council members are more interested in the efforts or actions to decrease city energy consumption (Laurian, Walker, & Crawford, 2017).

H2: There are more efforts to reduce city energy consumption with a larger rate of at-large seats against the total number of seats.

Policy-Making Applied to City Energy Consumption

Public Goods and Municipal-Owned Utilities.

Relevant studies on sustainable development have been conducted (Mulder & van den Bergh, 2001), but there is still not much empirical evidence is available on why governments pursue practical sustainability actions yet (Kates et al., 2001; Clark & Dickson, 2003). Lubell, Feiock, and Handy (2009) suggest that the model for sustainability policies related to theories of urban politics describes economic and political incentives in municipalities.

Tiebout's (1956) model, which is often explained as "voting with your feet," presumes that cities seek the optimal package of public goods and taxes. Generally, sustainable policies seem to offer a diverse package of public goods not provided by the private sector (Lubell, Feiock, & Handy, 2009, p. 296). However, in reference to service delivery of energy, some cities rely on the private or public sectors (including quasi-governmental agencies²), while others do not. They closely meet the demands for energy efficiency or saving. The ownership of public energy provides important opportunities for city governments to take action on green policy.

According to Yi, Matkin, and Feiock (2011), municipal-owned utilities have a significant role in municipal government efforts to designate energy efficiency strategies and implementation. In reference to adopting energy efficiency programs, overall they perform as an incentive or enforcement to city government (Homsy, 2015). Some cities with municipal-owned utilities purchase electricity even though the local government operates the utility business. Thus, they try to reduce the whole utility price, and that can lead to an effort to reduce city energy consumption or establish a new set of alternative energy sources. Municipal-owned utilities can facilitate action on the city's commitment to saving energy and improving energy efficiency compared to the private market.

H3: Municipal-owned utilities are more likely to be engaged in actions to reduce city energy consumption compared to privately-owned utilities.

City Fiscal Capacity and the Scale of the Economy.

Similar to private organizations, financially abundant municipalities generally have more resources and can afford to adopt new sustainability policies much more easily. Decreasing traditional energy consumption and developing or utilizing new energy sources potentially entails high financial and/or environmental risks and vulnerability (OECD, 2012). Many governments include financial and fiscal instruments, such as subsidies and grants, to enforce citizen participation in reducing energy use (Zhang, Cho, & Kinzley, 2016), and installing or upgrading existing facilities and system can be physically and financially burdensome for city governments. Given the importance of political and financial risks for sustainable energy investments, a municipality's fiscal condition is critical in taking action to reduce energy consumption. Thus, the (slack) resources or fiscal capacity of each municipality can be a critical indicator to be considered for empirical studies (Lubell et al., 2009; Wang et al., 2017).

In the same spectrum, the size of the workforce and energy prices affect the burden of energy use. So, it is likely to have a positive relationship between the use of energy and the scale of the workforce. In general, this scale of economy, in other words, the size of the workforce in government, is associated with the size of the city population. We can assume that the size of city

² This is difficult to define (Cole, 1998) and so scholars have failed to reach consensus (Mead & Warren, 2016, p. 292). A quasi-government entity is located between private and governmental sectors, called the "twilight zone" (Kosar, 2011, p. 7).

government and the city population will have both direct and indirect effects on governmental actions related to energy efficiency. Those effects might lead to developing new alternative energies in the long term, but they are more likely to start off saving energy in the short term.

H4: Cities with high fiscal capacity are more likely to make stronger efforts to reduce city energy consumption.

H5: Cities with larger populations are more likely to make stronger efforts to reduce city energy consumption.

Target Population.

The attributes of target populations influence the necessity of sustainability because population-related factors are connected with the growth or congestion of population and the level of heterogeneity, the degree of wealth, and diversity. As the growth of a population accelerates, the demand for energy efficiency increases. Infrastructure, such as transportation systems, should be enhanced, and the pressure for energy savings gets higher because of the limited natural resources and financial constraints. According to Conroy and Iqbal (2009), sustainable endeavors for transportation efficiency and green buildings are closely associated with population size. Also, Kearney (2005) insists that in reference to the adoption of green innovation, population change takes a key role in the scale of sustainability action.

H6: Cities with rapid population growth are more likely to make stronger efforts to reduce city energy consumption.

Methods

This paper concentrates on concrete actions that city governments take with ease. Their willingness to execute green policy can be associated with behavioral change, so by examining the factors affecting those actions, a city government is more likely to encourage efforts to reduce city energy consumption and enhance their city energy efficiency. To do so, this research went over the determinants driven by four dimensions: political factors, utility ownership, fiscal factors, and socio-demographic factors.

We tested our hypotheses using the 2010 ICMA data set to examine the level of action taken related to saving energy consumption by city governments with populations of over 25,000 in the United States in 2010. In more detail, the survey data named “2010 ICMA Local Government Sustainability Policies and Programs” was employed. The survey was distributed to 8,569 local governments, and the response rate was approximately 25.4%. After extracting local cities with populations over 25,000, 247 cities’ data were employed for our analysis (See Appendix 1).

A multiple regression analysis was conducted to analyze and test the hypotheses above. The multiple regression model is as follows.

Municipal actions for reducing energy use

$$= \beta_0 + \beta_1 * \text{form of government} + \beta_2 * \text{at-large elections} + \beta_3 * \text{municipal ownership} + \beta_4 * \text{fiscal capacity} + \beta_5 * \text{scale of economy} + \beta_6 * \text{population change} + \beta_7 * \text{ctrl variable}$$

An energy consumption and efficiency index was generated from the 2010 ICMA data set as the dependent variable, and the measures of independent variables, namely form-of-government, legislative institutions, municipal-owned utility, and fiscal capacity, were identified from the various data sources: demographic census data, energy-relevant data, and political data.

Measures

Dependent variable.

Actions for reducing energy use. The ICMA survey report presents 110 comprehensive indicators of sustainability policies and programs that each local government takes. Svava et al. (2013) categorizes them in more detail into 12 areas by their purpose—recycling, water conservation, transport improvements, energy use in transportation and exterior lighting, social inclusion, reducing building energy use, local production and green purchasing, land conservation and development rights, greenhouse gas reduction and air quality, building and land use regulations, workforce alternatives to reduce commuting, and alternative energy generation. According to their classification, we manipulated the 2010 ICMA data set and re-categorized the indicators for sustainable energy into energy in vehicles, electricity, and energy-relevant systems. We merged seventeen sub-survey questions about energy and created dummy variables for whether city governments took each action to reduce energy consumption and to improve energy efficiency (See Appendix 2). The dependent variable was the sum of these 17 dummy variables—variance of taking sustainable actions by city governments. This is directly connected to the actions of tangible cost-savings and to improving energy efficiency as a first step to achieving sustainability in a practical way. Moreover, those efforts implicitly reinforce alternative energy plans.

Independent variables.

The form of government. The form of government was coded as 1 for mayor-council form and otherwise as 0. Corresponding with hypothesis 1, the mayor-council form was expected to be less responsive to efforts to reduce energy consumption and improve energy efficiency, despite the expectations of conventional wisdom.

At-large elections. In reference to another political variable, this legislative institution–related variable was measured by the number of at-large seats against the total number of seats in a council.

By the ratio of seats, the prospective of policies would differ.

Municipal ownership. This variable indicated whether the utility was owned by the municipal government. We coded this variable as 1, indicating municipal-owned, and investor-owned facilities were coded as 0. In general, those utilities require huge infrastructure scales, and the status of ownership hardly changes. In the case of electricity, compared to 2002, only two cities had changed to municipal ownership in this research pool in 2010.

Fiscal capacity. To measure fiscal capacity, we used the amount of slack resources that city governments could utilize. Thus, fiscal capacity was measured as a percentage of difference between revenue and expenditure out of total revenue in each city government.

Scale of economy. Governmental effort to reduce energy would be closely associated with the size of the government workforce, and it is normally proportional to the size of a city population. Thus, scale of economy was measured as population size to estimate the workforce effect.

Population change. We organized population change as percentage of change between 2008 and 2010.

Control Variables.

We controlled for socio-demographic characteristics. Feiock, Tarares, and Lubell (2008, p. 462) state that growth management policies could provide special protections to pro-environmental interests and the differential between the poor and affluent citizens' concerns with quality of life. Socio-demographic characteristics (namely education and race) are linked to preferences for slow and smart growth. One of the green policy categories, land use, describes a powerful relevance between the degree of education and growth management efforts. Some literature describes social class bias in the action of growth control (Neiman & Loveridge, 1981; Navarro & Carson, 1991; Lewis & Neiman, 2002; Feiock et al., 2008). Prior studies show that minorities or citizens with higher education levels support adoption of sustainability programs (Lubell et al., 2009; Pike & Herr, 2011).

Considering this, we organized socio-demographic control variables of higher education and race. Specifically, we measured higher education as the percentage of high school degrees or higher attainment and race as the Caucasian population in each city. All the demographic information was collected from census data in 2010. The change of population was measured between 2008 and 2010, and the Caucasian portion was the ratio of white citizens against the total number of citizens. Also, education attainment was considered, counting the ratio of people over 25 attaining higher than a high school degree. A summary of measures and explanations is presented in Table 1 as follows.

Table 1

Dependent and Independent Variable Explanation

Variables	Explanation
Dependent variable Actions taken by government to reduce city energy consumption and improve energy efficiency	0-17 variance with sub-items
Independent variables Form of government	Mayor-council=1, Council-manager=0
The ratio of at-large elections against the total council seats	At large/total seats
Municipal-Ownership	MOU=1, investor=0
Fiscal Capacity	1- (total expenditure/ total tax revenue)
scale of economy	the year 2010 population
Population change	(pop2010-2008)/2008pop
High school or higher education attainment	Edu pop/ pop 25+ (%)
Caucasian population	White/total pop (%)

Results

The descriptive statistics and correlations are described in Table 2 and Table 3. The result of the correlation matrix implies that this model would have less problem with collinearity. The correlation between higher-education attainment and the ratio of Caucasian was the highest at 0.426, followed by the correlation between the ratio of Caucasian and scale of economy (0.205), and between the form of government and the ratio of at-large seats (0.204). Others were not so highly correlated in this model.

Table 2

Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Median	Min	Max
Action for reducing energy use	247	7.429	3.534	7	0	16
form of government	247	.146	.354	0	0	1
at-large elections	247	.539	.463	.429	0	1
municipal ownership	247	.85	.358	1	0	1
fiscal capacity	247	-.018	.171	.004	-.952	.496
scale of economy	247	83710.5	109978.3	54144	25012	1327407
population change	247	.05	.489	.02	-.25	7.66
higher education attainment	247	86.838	7.956	88.4	52.1	98.7
ratio of Caucasian	247	71.961	15.633	75.1	19.4	94.8

Table 3

Correlation Matrix

	2	3	4	5	6	7	8	9	
1. actions for reducing energy use	-.1999*		.1496*	.1476*	.0924*	.3270*	-.0102	.0432	-.1711*
2. form of government	1.0000								
3. at-large elections	-.2044*	1.0000							
4. municipal ownership	-.0517	-.0474	1.0000						
5. fiscal capacity	-.0137	.1516*	-.0130	1.0000					
6. scale of economy	-.0783	-.0716	.1126	.0157	1.0000				
7. population change	-.0163	.0647	.0240	.0178	.1838*	1.0000			
8. higher education attainment	.0730	-.0339	-.1659*		.0613	-.1186*		-.0889	1.0000
9. ratio of Caucasian	.1861*	-.1322*		.0192	-.0594	-.2050*		-.1487*	
		.4260*	1.0000						

*p < 0.05

Table 4 reports the result of the regression model. In reference to the effort to reduce city energy consumption and enhance energy efficiency, the form of government seemed to be a significant variable at a 0.05 level of significance, and the p value was .039. This result supports hypothesis 1 because the direction of the form of government coefficient implies that the mayor-council form was less likely to take practical action toward energy efficiency. Considering the emergence of the professionalism movement, the council-manager form overall sought efficiency more than the mayor-council form. This result is interesting because it is opposite to the findings of other studies. Sustainability policies have been considered pro-environmental actions, and prevalent empirical findings show that the mayor-council form has more friendly policies to the environment. Of course, the form of government is a critical indicator of whether the government places their effort in taking action for reducing energy consumption or improving energy efficiency, and there are not so many exceptions. But, the result from this study supports the findings from Feiock and Francis (2010), which are different from previous results. We think that although general and ambitious plans for sustainability are being pursued, practical ways of reducing energy consumption and achieving energy efficiency would meet both needs, which are pro-environment and pro-development, in some way of improving energy efficiency. Thus, those reasons might affect the results in this study. Another politically relevant coefficient, the ratio of at-large seats, showed statistical significance at 0.05 ($p = .023$), and it had a positive effect on the pro-sustainability actions. This means that a city with a higher rate of at-large council positions was more willing to take practical energy efficiency action as a way of achieving sustainability.

As a perspective on the supply-side factor, the p value for the coefficient of municipal-owned utilities was .014, statistically significant at the level of 0.05. It positively interacted with the governmental effort to reduce city energy consumption. Municipal-owned utilities often do not generate their own electricity, but they buy it from wholesale sources so as to not only satisfy local demands but also obtain it for a cheaper price (Yi et al., 2011). In this structure, city governments that own utility units would make effort to achieve energy efficiency and reduce energy consumption. Also, compared to cities that run investor-owned utilities, cities that run municipal-owned utilities provide electricity or water at a lower cost. Thus, this result implies that cities with municipal-owned utilities try to reach energy efficiency and reduce city energy consumption. Table 4 shows that the municipal-owned utility factor has a relatively strong effect on governmental action.

Regarding fiscal capacity, the fiscal capacity variable was insignificant and did not support hypothesis H4. Another determinant, scale of economy, measured as population size, implying the size of workforce in government, was positively significant ($p = .000$), supporting hypothesis 5. In general, as the population grows the government workforce gets bigger. The subsequent demand for more energy could work as a pressure to achieve energy efficiency or reduce city energy consumption.

In reference to socio-demographics, the coefficient of population change was statistically insignificant. However, the coefficient of higher education attainment was positively significant at 0.01 ($p = .009$), and the coefficient of Caucasian population was negatively significant at 0.05 ($p = .024$). This is interesting because related to sustainability or green policy literature, the ratio

of the Caucasian population overall had a positive effect. However, this model showed reverse results, and it will be explicatively examined in further research to confirm this relationship. As a supporting explanation of this finding, we would describe that although the Caucasian population was interested in green policy more than in previous literature, they might have more demands on the city government with higher Caucasian population to construct infrastructure, such as more lights on the street or less regulation on building insulation and so forth.

Table 4

Determinants of Actions Taken by Government to Reduce City Energy Consumption and Improve Energy Efficiency

Variables	Coef.	Std. Err.	t	P> t
form of government	-1.245	0.599	-2.080	0.039**
at-large elections	1.054	0.461	2.280	0.023**
municipal ownership	1.447	0.586	2.470	0.014**
fiscal capacity	1.007	1.212	0.830	0.407
scale of economy	0.000	0.000	5.220	0.000***
population change	-0.657	0.428	-1.540	0.126
higher education attainment	0.077	0.029	2.640	0.009***
ratio of Caucasian	-0.034	0.015	-2.270	0.024**
_cons	0.836	2.463	0.340	0.735

Notes. Prob > F = 0.000, Adj R-squared = 0.183

*p < 0.10; **p < 0.05; ***p < 0.01

Discussion

As a way of greening policy action, this study has focused on the reduction of energy consumption and the enhancement of energy efficiency. Despite the stress on sustainability by upper-level

governments, the issue has been relatively less considered at the local level. However, a successful sustainability policy primarily driven by higher levels of government is greatly affected by the capability of local governments in policy implementation. From this perspective, this study aimed to fill the gap between structural institutions and sustainability relevant policy action as applied to political market frameworks. The findings show that city government institutions and political institutions matter for greening policy actions. The ownership of public utilities by governments has an effect on the level of energy consumption and the level of energy efficiency. Beyond that, socio-demographic factors are considerably associated with the success of a policy action.

Through the multiple regression model, the findings show that four categories had significant effects on the effort to reduce city energy consumption and improve energy efficiency. More specifically, with regard to political factors, the council-manager form was more in favor of taking energy efficiency action, which is an interesting result. That is, the council-manager was more likely to be in favor of those sustainability actions. Meanwhile, at-large elected politicians were more interested in the concrete effort of achieving energy efficiency in a practical way. Utility ownership was also a critical factor of governmental action. The statistical results show that municipal-owned utilities had a positive relationship with energy policy. However, fiscal capacity or (slack) resources of local government had no significant influence on sustainability actions.

These results give us an important implication that sustainability policies can be derived by administrative design, not by functional need. Interest group pressures and citizen support are an effective driver for shaping political decisions, and local governments have incentives to deal with sustainability issues aside from their functional context and constraints. This suggests that sustainability initiatives can be the outcome of administrative/political design. This can also raise an inquiry into how participation of the public and interest groups and stakeholders' reactions—the demand side of policy decision—can influence the process of governance in sustainability policy arenas. Even in the European context, demand-side policy change in sustainability is understudied (Creutzig et al., 2018; Vita et al., 2019). Additional future research should address the dynamics and outcomes among administrative units and stakeholders and how their interactions lead to policy change at the local level.

Regarding economic and socio-demographic elements, cities with a higher level of education attainment were more active in sustainability policy. This implies that more educated cities see greening policies more positively. Also, the scale of economy matters in reducing energy consumption and improving energy efficiency. However, some unexpected findings emerged. The growth of populations and the ratio of Caucasians were negatively correlated with sustainability. These two findings are left for the future research.

However, there are some limitations. Some of data we utilized was a bit outdated, although it was a cross-sectional analysis. If these government actions were investigated in a time series model, the effectiveness of those factors would be more observed and meaningful as time-series analysis can show the change of governmental actions related to energy efficiency driven by each factor more actively and precisely. Nevertheless, this cross-sectional research would be helpful to formulate trial assumptions for further longitudinal studies.

Implications for the Future Direction of Asian Countries

Compared to the past decades, the central governmental authorities in Asian countries have been allocated to local governments regarding local development and greening policies (Deng, Yang, Tang, & Tang, 2018; Hwang, 2017). The evidence of the U.S. sustainability policies reflects the direction of where Asian countries move towards. Under an effort of devolution of the authorities to local and municipal governments, the structure of the government institutions can matter in reducing energy consumption and greening policy actions. In order to meet the requirements with the international regimes of climate change, Asian countries have strived to lower fossil energy consumption and enhance the energy efficiency as a way of going green.

Prior studies emphasized that financial resources are important to facilitate green actions for improving energy efficiency in Asia (Bailey & Pomeroy, 1996; Dulal, Dulal, & Yadav, 2015; Ng & Tao, 2016). However, according to our finding, sustainable actions is not a matter of resource but an outcome of administrative context, at least in public area. Therefore, contemporary policy directions to promote green policies in Asia, which focus on financial incentives of local governments, needs to be re-considered and/or redirected with regard to local policy context and administration. Regarding the results of the sociodemographic factors, scale of economy matters in sustainability actions. The size of the Asian counties varies and some have not even considered greening policy yet. In this stream, when initiating greening policy actions, the sustainable policy can be considered in bigger cities first where scale of economy can be relatively highly achieved.

The issue of sustainability is now one of the biggest global agendas for achieving both economic development and environmental protection. For example, Asian countries such as Korea and China operate the public bike sharing program as a way of reducing fossil resources and facilitating greening cities. Also, governmental buildings in Korea are pursued for enhancing the energy efficiency as upgrading or installing the new systems. The level of the willingness to consider the energy efficiency and make an effort of reducing energy consumption can vary depending on the factors that we investigated in this research. Policies and financial incentives, and political schemes at local level is critical to address sustainability issues. This study took a look at the current local sustainability policies and discuss the motivations of developing green policies from the U.S experience. Our findings can shed light on the effort of greening in Asian countries.

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Appendix 1.
List of the US cities for the analysis

	City	STATE		City	STATE
1	Auburn	AL	125	Salina	KS
2	Enterprise	AL	126	Jeffersontown	KY
3	Montgomery	AL	127	Springfield	MA
4	Prattville	AL	128	Salisbury	MD
5	Hot Springs	AR	129	Lewiston	ME
6	Apache Junction	AZ	130	Portland	ME
7	Bullhead City	AZ	131	Ann Arbor	MI
8	Chandler	AZ	132	East Lansing	MI
9	Glendale	AZ	133	Farmington Hills	MI
10	Peoria	AZ	134	Garden City	MI
11	Prescott	AZ	135	Jackson	MI
12	Yuma	AZ	136	Livonia	MI
13	Alameda	CA	137	Madison Heights	MI
14	Anaheim	CA	138	Roseville	MI
15	Bakersfield	CA	139	Sterling Heights	MI
16	Beverly Hills	CA	140	Andover	MN
17	Burlingame	CA	141	Bloomington	MN
18	Camarillo	CA	142	Burnsville	MN
19	Carlsbad	CA	143	Duluth	MN
20	Chico	CA	144	Maple Grove	MN
21	Chula Vista	CA	145	Minneapolis	MN
22	Claremont	CA	146	Minnetonka	MN
23	Concord	CA	147	Moorhead	MN
24	Covina	CA	148	Rochester	MN
25	Cupertino	CA	149	Savage	MN
26	Desert Hot Springs	CA	150	Shakopee	MN
27	Dublin	CA	151	Ballwin	MO
28	El Monte	CA	152	Cape Girardeau	MO
29	Elk Grove	CA	153	Gladstone	MO
30	Fullerton	CA	154	Maryland Heights	MO
31	Gilroy	CA	155	Bozeman	MT
32	Hayward	CA	156	Missoula	MT
33	Hesperia	CA	157	Asheboro	NC
34	La Mesa	CA	158	Burlington	NC
35	Laguna Niguel	CA	159	Concord	NC
36	Manteca	CA	160	Fayetteville	NC
37	Martinez	CA	161	Gastonia	NC
38	Merced	CA	162	Goldsboro	NC
39	Monterey Park	CA	163	Hickory	NC
40	Morgan Hill	CA	164	High Point	NC
41	Mountain View	CA	165	Rocky Mount	NC

42	Murrieta	CA	166	Winston Salem	NC
43	Newark	CA	167	Fremont	NE
44	Novato	CA	168	Grand Island	NE
45	Pacifica	CA	169	Kearney	NE
46	Palm Springs	CA	170	Concord	NH
47	Palo Alto	CA	171	Dover	NH
48	Pasadena	CA	172	Roswell	NM
49	Paso Robles	CA	173	Las Vegas	NV
50	Pleasanton	CA	174	Binghamton	NY
51	Poway	CA	175	New Rochelle	NY
52	Redding	CA	176	Syracuse	NY
53	Richmond	CA	177	Cleveland	OH
54	Rocklin	CA	178	Fairborn	OH
55	Roseville	CA	179	Huber Heights	OH
56	San Bruno	CA	180	Medina	OH
57	San Carlos	CA	181	Troy	OH
58	San Jacinto	CA	182	Westerville	OH
59	San Juan Capistrano	CA	183	Broken Arrow	OK
60	San Mateo	CA	184	Lawton	OK
61	San Rafael	CA	185	Muskogee	OK
62	Santa Maria	CA	186	Oklahoma City	OK
63	Santa Monica	CA	187	Albany	OR
64	Santa Rosa	CA	188	Hillsboro	OR
65	Seaside	CA	189	Lake Oswego	OR
66	Soledad	CA	190	Redmond	OR
67	South San Francisco	CA	191	Tualatin	OR
68	Thousand Oaks	CA	192	York	PA
69	Torrance	CA	193	East Providence	RI
70	Tracy	CA	194	Warwick	RI
71	Twentynine Palms	CA	195	Columbia	SC
72	Union City	CA	196	Greenville	SC
73	Valencia	CA	197	Brentwood	TN
74	Walnut Creek	CA	198	Johnson City	TN
75	Woodland	CA	199	Morristown	TN
76	Arvada	CO	200	Allen	TX
77	Centennial	CO	201	Amarillo	TX
78	Englewood	CO	202	Big Spring	TX
79	Littleton	CO	203	Bryan	TX
80	Loveland	CO	204	Duncanville	TX
81	Pueblo	CO	205	Grand Prairie	TX
82	Shelton	CT	206	Greenville	TX
83	Newark	DE	207	Haltom City	TX
84	Bonita Springs	FL	208	Harlingen	TX
85	Bradenton	FL	209	Hurst	TX

86	Clearwater	FL	210	McAllen	TX
87	Cooper City	FL	211	Mesquite	TX
88	Coral Springs	FL	212	Midland	TX
89	Dania Beach	FL	213	Pearland	TX
90	Delray Beach	FL	214	Round Rock	TX
91	Hallandale Beach	FL	215	San Antonio	TX
92	Lake Worth	FL	216	San Juan	TX
93	North Port	FL	217	Sugar Land	TX
94	Ocala	FL	218	Texarkana	TX
95	Ormond Beach	FL	219	Tyler	TX
96	Palm Bay	FL	220	Waco	TX
97	Palm Coast	FL	221	Weatherford	TX
98	Sunrise	FL	222	Cedar City	UT
99	Titusville	FL	223	Clearfield	UT
100	Albany	GA	224	Midvale	UT
101	Alpharetta	GA	225	Orem	UT
102	Duluth	GA	226	Provo	UT
103	Peachtree City	GA	227	Roy	UT
104	Des Moines	IA	228	South Jordan	UT
105	Dubuque	IA	229	Springville	UT
106	Marshalltown	IA	230	Taylorsville	UT
107	Mason City	IA	231	Chesapeake	VA
108	Ottumwa	IA	232	Harrisonburg	VA
109	Post Falls	ID	233	Lynchburg	VA
110	Carbondale	IL	234	Portsmouth	VA
111	Champaign	IL	235	Roanoke	VA
112	Evanston	IL	236	Virginia Beach	VA
113	Galesburg	IL	237	Burien	WA
114	Highland Park	IL	238	Kirkland	WA
115	Joliet	IL	239	Olympia	WA
116	Moline	IL	240	Redmond	WA
117	Naperville	IL	241	Sammamish	WA
118	O Fallon	IL	242	Shoreline	WA
119	Rock Island	IL	243	Tacoma	WA
120	Rockford	IL	244	Beloit	WI
121	West Chicago	IL	245	Sun Prairie	WI
122	Wheaton	IL	246	West Bend	WI
123	Manhattan	KS	247	Casper	WY
124	Olathe	KS			

Appendix 2.

Dependent variable

Actions taken by government to reduce city energy consumption and improve energy efficiency

Energy (ICMA 2010)

Which of the following actions has your government taken to decrease its use of energy?

Action
a. Established a fuel efficiency target for the government fleet of vehicles
b. Increased the purchase of fuel efficient vehicles
c. Purchased hybrid electric vehicles
d. Purchased vehicles that operate on compressed natural gas (CNG)
e. Installed charging stations for electric vehicles
f. Conducted energy audits of government buildings
g. Installed energy management systems to control heating and cooling in buildings
h. Established policy to only purchase Energy Star equipment when available
i. Upgraded or retrofitted facilities to higher energy efficiency office lighting
j. Upgraded or retrofitted traffic signals to improve efficiency
k. Upgraded or retrofitted streetlights and/or and other exterior lighting to improve efficiency
l. Upgraded or retrofitted facilities to higher energy efficiency heating and air conditioning systems
m. Upgraded or retrofitted facilities to higher energy efficiency pumps in the water or sewer systems
n. Utilize dark sky compliant outdoor light fixtures
o. Installed solar panels on a government facility
p. Installed a geo-thermal system
q. Generated electricity through municipal operations such as refuse disposal, wastewater treatment, or landfill



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