

## **NETWORK GOVERNANCE AND STAKEHOLDER ENGAGEMENT FOR SUSTAINABLE DEVELOPMENT**

**Naim Kapucu,**

Pegasus Professor, School of Public Administration  
Joint faculty, Resilient, Intelligent and Sustainable Energy Systems (RISES)  
University of Central Florida  
528 W. Livingston St., Suite 446  
Orlando, FL 32801, USA

(407) 823-2604  
[kapucu@ucf.edu](mailto:kapucu@ucf.edu)

**Sean Beaudet,** MPA

Florida Department of Environmental Protection  
Orlando, Florida, USA  
[seanbeaudet@Knights.ucf.edu](mailto:seanbeaudet@Knights.ucf.edu)

### **ABSTRACT**

In 2015, the United Nations (U.N.) and member states created goals and benchmarks for the Sustainable Development Goals (SDGs) to address decades of inequality, environmental degradation, and economic disparity. Further, as human populations are expanding around the globe, and especially in urban settings, the New Urban Agenda was created a year later acknowledging that urbanization is one of this century's most transformative trends. A primary concern is understanding what actions municipalities have taken that lead to more sustainable cities and communities, and how stakeholder engagement has aided in the process. One other facet is to understand how communities can incorporate the food, energy, and water resources in projects to reduce waste and tradeoffs, otherwise known as the Food-Energy-Water (FEW) Nexus. We conducted a multi-stage systematic literature review and examined a case study of the City of Orlando, Florida, United States. Major findings were that widespread stakeholder engagement, dedicated funding, institutionalization of plans and actions, and public leadership support were critical in local sustainable development.

**Keywords:** Stakeholder Engagement, Network Governance, Sustainability, Sustainable Development Goals, Orlando

## Introduction

Past decades of inequality, environmental degradation, and economic disparity have led to the realization that such actions are undesirable and unsustainable. In response to the threats, the United Nations (U.N.) and member states created actions and benchmarks in 2015 known as the Sustainable Development Goals (SDGs). Sustainable development encapsulates economic, social, and environmental components and the SDGs seek to address them through a balanced and integrated approach (United Nations, 2015). Further, human populations are expanding around the globe and continues to increase at a higher rate in urban settings. As a result, the *New Urban Agenda* was created a year after the SDGs and recognized that urbanization is one of this century's most transformative trends around the world (United Nations, 2017).

If precautions and proper planning are not taken, this trend will place additional burdens on cities around the globe and impact their ability to provide sufficient and equitable services to communities. Some examples would include decreased health and well-being (Goal 3) from increased air pollution, ability to provide clean water and sanitation services (Goal 6), and the inability to provide safe and sufficient infrastructure (Goal 9) to name a few. However, successful integration and implementation of the SDGs in community planning and actions could significantly improve the lives of all residents. This would include decent work and economic growth (Goal 8) to help eliminate poverty (Goal 1), affordable and clean energy (Goal 7) to reduce carbon emissions contributing to climate change (Goal 13), and enabling responsible consumption and production (Goal 12) to reduce food and other waste (Goal 2) as examples.

As this study is focused on sustainability at the local scale, a primary concern is understanding what actions municipalities can take that leads to more sustainable cities and communities (Goal 11), and how stakeholder engagement can aid in the process. One other facet is to understand how communities can incorporate the food, energy, and water resources in projects to reduce waste and tradeoffs through a nexus approach, otherwise known as the Food-Energy-Water (FEW) Nexus. This study addresses the following research questions: What are the conditions or incentives that lead to higher levels of stakeholder engagement in collective action for sustainability? Who are the key network partners to achieve the SDGs at the local level? Who are the key network partners of the FEW nexuses? How is the impact of the actions of local officials and the regulatory environment where sustainability projects thrive measured? We conducted a multi-stage systematic literature review. As contribution to this growing body of literature, we examine a case study – the City of Orlando, Florida, United States – and its internal planning guides and other material through content analysis to identify the stakeholders and processes utilized in working to make the community more sustainable and working to meet the SDGs at the local scale.

## Literature Review & Background

In order to capture the most contemporary research for this study, a systematic literature review was conducted. The resulting articles show that literature comes from numerous disciplines and journals, and meeting the targets contained within the SDGs will require an interdisciplinary approach from scholarly research, individuals, communities, organizations, and governments. The literature also shows that sustainability has been analyzed through various theoretical lenses, frameworks, scales, and case studies.

One example sought to address such multiscale and multilevel issues through a collection of theories and models for global change policies on sustainability and UN SDGs (Anderies, Folke, Walker, & Ostrom, 2013; Robin, & Acuto, 2018). Others have taken a whole system approach through meta-governance (Meuleman & Niestroy, 2015) and the Anthropocene (Norstrom, Dannenberg, McCarney, Milkoreit, Diekert, Engstrom, Fishman, Gars, Kyriakopoulou, Manoussi, Meng, Metian, Sanctuary, Schluter, Schoon, Schultz, & Sjøstedt, 2014; Lim, Sjøgaard Jørgensen, & Wyborn, 2018). At the other end of the spectrum, studies have focused on the urban level (Bansard, Hickmann, & Kern, 2019). This should be of no surprise as the SDGs are far-reaching and address social, economic, and environmental issues at different scales (Arthington, Bhaduri, Bunn, et al., 2018; Lim, Sjøgaard Jørgensen, & Wyborn, 2018). With our systematic literature review, we sought previous work more specific to networks, stakeholder engagement, collective action for sustainability, and the Food-Energy-Water (FEW) nexus.

***Networks governance for effective partnerships.*** A network is defined as three or more independent autonomous organizations working together to achieve both organizational and collective goals (Provan & Kenis, 2008). Further, a network is a set of actors, or nodes, and the relational ties among them (Brass, Galaskiewicz, Greve, & Tsai, 2004). Research on networks focuses upon actor communication, influence, organization, structure, and network evolution (Kilduff & Brass, 2010). An example from the literature was examination of network governance structures postulated by Provan and Kenis (2008) in the context of agricultural development policy networks (Rudnick, Niles, Lubell, & Cramer, 2019). Also studied are information flows, affects, workflow, influence among the actors, and the embeddedness or location of actors within the group (Brass, Galaskiewicz, Greve, & Tsai, 2004). Extensive research on networks has been conducted by scholars from a variety of fields and through numerous contexts. Previous research has shown that synthesizing the network literature is a complex task due to this fact (Carpenter, Li, & Jiang, 2012; Kapucu & Hu, 2020).

Reasons that network governance research continues to grow is that emerging global threats like climate change and resource depletion present new complex challenges. These challenges transcend the capacities, resources, and borders of individual sovereign states (Chidozie & Aje, 2017). Likewise, these challenges are being faced within countries at the state, regional, and local levels. Some scholars have shown that resource management such as water and energy can arise from governance issues rather than scarcity (Ahmed & Araral, 2019; Simoes, 2017). Others have examined the impacts that globalization will have on management of resources (Yu, Anderies, Lee, & Perez, 2014) and global production networks (Franz, Schlitz, & Schumacher, 2018). Additional research has focused on individual countries internal strategies and external financial commitments to achieve the SDGs (Tianbao, & Fang, 2018).

Strains of research also focused on was how networks of private organizations engage in global corporate social responsibility initiatives (Albareda, & Waddock, 2018; Kell, 2012), the relations between private organizations and nongovernmental organizations (Harangozo & Zilahy, 2015), businesses motives for engaging in multi-stakeholder initiatives (Lundsgaarde, 2017), and the roles of foreign ministries (Kamphof & Melissen, 2018; Wong, 2019) in the pursuit of sustainable development. As a result, new governance mechanisms are evolving to tackle the cross-cutting, cross-boundary challenges. This include governments, the private sector, academia, and nonprofits working together through networks and partnerships. Thus, research on

these network arrangements continues to expand. Various terms have been developed to describe these collaborations such as multi-stakeholder initiatives, public-private partnerships (PPP), cross-sector collaborations, hybrid governance mechanisms (HGMs) (Florini & Pauli, 2018; Mert, 2013). Regardless of the title, the reason for their formation remains the same, to tackle an issue that is beyond the scope and abilities of any one entity and that must be addressed through collective effort.

One approach, as explained by Klijn and Koppenjan (2012), is *managing networks* which focuses on solving public problems in and through networks, understanding the complexity involved in the decision-making process, examining the deliberation process between actors, and improving network processes for policy implementation. Researchers also employ Social Network Analysis (SNA) and it has shown promise in improving the construction and design of networks as governance strategies in the meeting the challenges of sustainability (Muñoz-Erickson & Cutts, 2016). SNA, much like the research on sustainability in general, has also been employed by scholars from a plethora of fields and in a variety of contexts (Min, Yoon, & Furuya, 2019; Hu, Khosa, & Kapucu, 2015).

Support of multi-stakeholder partnerships as implementation mechanisms has continued to grow as has the view that governments cannot alone meet these emerging complex challenges (Florini & Pauli, 2018). Network governance views public and private organizations as interdependent and embedded in a decentralized system who must work together through a network, or collaborative partnerships, to achieve desirable outcomes (Yi, Suo, Shen, Zhang, Ramaswami, & Feiock, 2018).

When drafting the SDGs, the U.N. recognized the critical role that partnerships would play in the implementation and ultimate realization of the goals. Explicit evidence of this is found as a goal in and of itself - Goal 17: Partnerships. The other sixteen SDGs rely on partnerships between governments, the private sector, and civil society organizations at global, regional, national, and local levels to achieve the goals (Sustainable Development Goals, 2019). The U.N. emphasizes working through international collaborative networks to achieve the SDGs (Bergman, Bergman, Fernandes, Grossrieder, & Schneider, 2018).

***Stakeholder engagement in networks.*** Stakeholders are those individuals or groups who have a vested interest in the success of a project or objective (Berrone, Ricart, Duch, Bernardo, Salvador, Pena, & Planas, 2019). When considering the SDGs, a multitude of objectives are contained within them and achievement requires numerous stakeholders working together through partnerships and engagement. Thus, the overall success of sustainability efforts requires the engagement of stakeholders across the spectrum of society. One obstacle requires stakeholders working together whose incentives may not necessarily be in alignment with the communal goals (Henry and Dietz, 2011; Kuchler, 2017). Similar concerns have been expressed on the effectiveness of transnational multistakeholder partnerships (Pattberg & Widerberg, 2015). Yet, collaborative networks sustained over time lead to common norms and routine deliberation (Bodin, 2017; Ott, 2017). It can also lead to cooperative learning, empowerment, and engagement (Ofei-Manu, Didham, Byun, Phillips, Gamaralalage, & Rees, 2018). Additionally, input and engagement of all stakeholders throughout the entire process can help to mitigate stakeholder dissatisfaction with the process, lead to better results, and gain broader support (Bielicki, Beetstra, Kast, Wang, & Tang, 2019; Berrone et al, 2019).

Much like any arrangement, the conditions and level of involvement of the stakeholders are critical in any partnership. Pattberg and Widerberg (2015) outlined nine conditions for successful sustainable development partnerships and the first two involve the optimal partner mix and effective leadership. They argued that success depends on willingness, capability, and resources of all partners, and most certainly from the most powerful and influential members (Pattberg & Widerberg, 2015). Secondly, leadership is just as important and different partnerships will need different types of styles for effective network governance such as a broker, convener, or an orchestrator (Pattberg & Widerberg, 2015). Likewise, other researchers agree that the engagement and participation of all relevant stakeholders is critical and can be a decisive factor in the success of a project(s) (Berrone et al, 2019).

The use of the Appreciation-Influence-Control (AIC) framework was highlighted as an effective governance model to address power imbalances and conflict among stakeholders as it takes a whole system view, inclusive search for solutions, and explicit treatment of power (Ratner, Mam, & Halpern, 2014). One innovative approach in the literature was the creation of a tool (EVOLvINC) that could be used in interdisciplinary, multi-stakeholder policy formulation that synthesizes knowledge, organizes members, provides mutual learning, capacity building, and strengthened networks for improved policy implementation and governance (Hitziger, Aragrande, Berezowski, Canali, Del Rio Vilas, Hoffmann, Igrejas, Keune, Lux, Bruce, Palenberg, Pohl, Radeski, Richter, Robledo Abad, Salerno, Savic, Schirmer, Vogler, & Rüegg, 2019). These examples illustrate the need and desire to maximize the involvement and effectiveness of stakeholders in meeting collective goals.

**Collective action for sustainability.** The desire to achieve collective action is found within Transforming our world: the 2030 Agenda for Sustainable Development, which resulted in the creation of the SDGs. One of the most poignant statements from the document illustrates this fact: “We are setting out together on the path towards sustainable development, devoting ourselves collectively to the pursuit of global development...” (United Nations, 2015, p. 6). Collective-action issues can exist at different scales and can involve problems related to global resources (Ostrom, 2008). Issues with governance of global natural resources and how monitoring and national information sharing are crucial (Bringezu, Potočnik, Schandl, Lu, Ramaswami, Swilling, & Suh, 2016). In the same stream, others also acknowledge the power that Information and Communications Technology (ICT) can play through knowledge sharing (Kostoska & Kocarev, 2019). Others have addressed global and local knowledge sharing networks on place-based initiatives for sustainable food systems (Blay-Palmer, Sonnino, & Custot, 2016; Moragues-Faus & Sonnino, 2019).

The concept of ‘good governance’ emerged in international development circles in the late 1980’s and entail many positive characteristics such as the rule of law, accountability, efficiency, tolerance, and gender equality (Meadowcroft, 2007). In addition, there is consensus that sustainable development depends greatly upon good governance within each country, especially developing countries, and at the global level (Meadowcroft, 2007; Auriacombe & Vyas-Doorgapersad, 2019). The management and consumption of common-pool resources at international, national, regional, and local levels require institutions other than centralized, hierarchical government structures and open, competitive markets (Ostrom, 2008). Collective action problems require learning, cooperation, and fair distribution of resources among the actors

(Lubell, 2015). Fisheries have commonly been used to analyze common-pool, collective action issues (Foley & McCay, 2014).

An examination of multiple factors facilitates an understanding for the necessity of collaborative decision-making for collective action. Many public challenges cross single agency boundaries, outsourcing and contracting between private and public organizations continues to increase, desire for improved effectiveness and efficiency drives government innovation, advancements in technology and data sharing, and increasing citizen engagement in government are driving forces toward collaborative governance (O’Leary & Vij, 2012). The role that different types of social capital networks played in assessing sustainable development (Kusakabe, 2012; Stein, Pahl-Wostl, & Barron, 2018), and common pool resource management (Rico Garcia-Amado, Ruiz Perez, Iniesta-Arandia, Dahringer, Reyes, & Barrasa, 2012) through decision-making, organizing, and collective action.

***Sustainability and the Food-Energy-Water Nexus.*** The SDGs are frequently noted as being comprehensive and extremely ambitious. An inherent obstacle with all-encompassing goals is the means in which to implement those goals. One of the critiques that arose in the literature is “the targets are largely silent about interlinkages and interdependencies among goals” (Stafford-Smith, Griggs, Gaffney, Ullah, Reyers, Kanie, Stigson, Shrivastava, Leach, & O’Connell, 2017, p. 912). A similar critique is that many of the goals remain sectoral in their basic outlook, connections among them are weak, and a cross-sectoral institutionalization of the goals is needed for implementation (Boas, Biermann, & Kanie, 2016; Lim, Søggaard Jørgensen, & Wyborn, 2018). Others have called for greater focus on the interconnectedness between the goals, which can reduce tradeoffs and enhance implementation (Elder, Bengtsson, & Akenji, 2016).

One approach to rectify this shortcoming that has received considerable attention is the Food-Energy-Water (FEW) Nexus (Wicaksono, Jeong, & Kang, 2019). Similar approaches have incorporated land (Cremades, Mitter, Tudose, Sanchez-Plaza, Graves, Broekman, Bender, Giupponi, Koundouri, Bahri, Cheval, Cortekar, Moreno, Melo, Karner, Ungurean, Davidescu, Kropf, Brouwer, & Marin, 2019) and other systems (Sperling & Berke, 2017; Schmidt & Matthews, 2018) into the FEW equations. The underlying premise is resources are interconnected and dependent upon the others. Failures in one system, can lead to the demise of the others. Thus, the concern is one of resource security. Pahl-Wostl (2017) provides a valuable statement of the FEW nexus approach as, “...reducing trade-offs to acceptable levels and to enhancing synergies between efforts to simultaneously increase water, energy, and food security, respectively, to sustain human-wellbeing, economic production and environmental integrity and to enhance the resilience of the human-environment-technology system as a whole” (p. 361).

Previous research suggests much of the prevailing studies aim to understand or quantify the resource and technical aspects of the FEW nexus, and do not address the challenges to governance, management, and policy integration (Daher, Hannibal, Portney, & Mohtar, 2019; Yung, Louder, Gallagher, Jones, & Wyborn, 2019). However, headway has been made by scholars on the governance and policy implications. This has been conducted at different levels, but within our literature review appears most prevalent at the transnational, regional, and urban scale. Examples from the literature at the transnational and regional level analyzed issues in the Great Lakes Region (Bielicki et al, 2019) and the Columbia River Basin (Givens, Padowski, Guzman, Malek, Witinok-Huber, Cosens, Briscoe, Boll, & Adam, 2018) in the United States,

transboundary river basins in Europe and Asia (de Strasser, Lipponen, Howells, Stec, & Brethaut, 2016; Giupponi, & Gain, 2017), and sub-Saharan Africa (Ding, Gunda, & Hornberger, 2019). Other areas where the FEW nexus frameworks have been applied is alternative energy production (Pasquel, Bollmann, Scott, Edwiges, & Baptista, 2018; Dombrosky & Hensengerth, 2018).

In addition, FEW nexus studies are gaining attention at the urban scale and are increasingly the focal point in analyzing the FEW nexus (Schlor, Venghaus, & Hake, 2018; Covarrubias, 2019; Artioli, Acuto, & McArthur, 2017). Within the literature review, articles examined different case studies in Amsterdam (Covarrubias, Spaargaren, & Boas, 2019), Barcelona (Covarrubias & Boas, 2019), Phoenix (White, Jones, Maciejewski, Aggarwal, & Mascaro, 2017), and San Antonio (Daher et al., 2019).

### **Context of the Study**

The SDGs, unlike previous attempts by the U.N., were developed in a bottom-up, multi-stakeholder forum with partnerships serving as an innovative feature of the goals (Biermann, Kanie, & Kim, 2017). Each country is left to its own to determine the best course of action and simply requires voluntary reporting on progress made toward the SDGs called the Voluntary National Review (VNR). The purpose of VNRs are to facilitate the sharing of successes, challenges and lessons learned; to strengthen policies and government institutions; and to mobilize multi-stakeholder support and foster partnerships (U.N. Department of Economic and Social Affairs, Division for Sustainable Development Goals, 2020). While many countries, both developing and developed, have provided VNRs, the United States has not submitted a report since the inception of the SDGs. As a result, cities across the country are beginning to provide their own reports.

In 2018, New York City became the first municipality in the U.S., and the world for that matter, to create a VLR and report directly to the U.N. High-level Political Forum (HLPF) on the city's implementation and progress towards the SDGs since 2015 (Risse, 2018). More recently, over twenty cities around the globe signed the VLR Declaration during the 2019 UN SDG Summit which they committed to: identify how their existing strategies and measures align with the SDGs, provide at least one forum for stakeholder to share information, and to submit their own VLR during the HLPF on sustainable development (Risse, 2019). Among the cities to sign the declaration was the City of Orlando, Florida of the U.S.

Orlando is the largest city in the Central Florida metropolitan area. The municipality was formally incorporated in 1875 with 85 inhabitants (City of Orlando, 2020a) and has grown tremendously over the decades. The most recent population estimates from 2018 show it is home to 285,713 residents and the population has increased by 19.6% since 2010 (U.S. Census Bureau, 2019). The municipality is administered under a strong mayor-council form of government. The mayor, who is elected and serves at-large, is the chief executive officer with the six council members, elected from separate districts, serving in a legislative capacity. The current mayor, Buddy Dyer, took office in 2003 and has been reelected multiple times.

In 2007, Mayor Dyer launched the Green Works Orlando initiative to “transform Orlando into one of the most environmentally-friendly, economically and socially vibrant communities in the nation” (City of Orlando, 2020b). Since the initiation of the program, the city has taken numerous actions and has implemented various measures that ultimately work towards meeting

the SDGs. Some include expanded public transportation, LEED-certified municipal buildings, fleet vehicle conversion, increased overall recycling rates, increasing the tree canopy, and many others (City of Orlando, 2020b). More recently, the mayor created the city's first Office of Sustainability and Resilience to further implement and coordinate the initiative (City of Orlando, 2020c). Since the creation of this central coordinating office, additional actions have been taken and those actions have been guided by internal organizational documents, community input, and various forms of partnerships and engagement.

## Method

We utilized a systematic literature review and collected secondary sources on a case study (Stake, 2005; Yin, 2009). A systematic literature review was conducted to gauge the current state of research on the subject (Creswell, 2007). The process was conducted in multiple stages over the course of two months. The key qualifiers used in all searches consisted of peer reviewed, academic journal articles published between January 2010 to December 2019. Further, results were limited to those in English and Full Text. The variation between the searches was due to selected keywords, combinations of keywords, and the use of different databases. The keywords consisted of 'Collective Action', 'Food Energy Water Nexus', 'Global Network', 'Global Partnership', 'Governance', 'Network Governance', 'Public Private Partnerships', 'Stakeholder Engagement', 'Sustainability', 'Sustainable Development', 'Sustainable Development Goals', and 'United Nations.'

The first stage utilized the search engine, EBSCOhost, to search hundreds of data bases and used the 'All Fields' search using single keywords. This resulted in hundreds of results and initial inspection revealed many unrelated articles. To trim the list, keywords were limited to 'Subject Terms.' This resulted in a smaller and more applicable number of results. Finally, a third round was conducted with this search engine using quotations around the keywords and use of different combinations, which resulted in even smaller but relevant returns. Due to proprietary and licensing agreements with the University, not all databases were captured with EBSCOhost and additional search engines would need to be utilized. This would lead to the next and final stage of searches using ProQuest, Thomson Reuters, and SAGE databases. The same qualifying criteria were used in the previous search and the use of 'Subject' or 'Topic' Terms sought to capture the most relevant journal articles, must like the final search of EBSCOhost.

The results from the searches led to a total of two hundred and two (202) articles from the four databases. Following the results of the search, electronic versions of the articles were saved for further inspection. The next step in the review was to finalize the articles that referenced the SDGs, networks, collective action, and the FEW. This dwindled the collection to sixty-five (65) remaining articles. The articles excluded from the original collection discussed education and institutions, health, ecology, alternative energy production, transportation, engineering and other modeling approaches, and case studies not related to this specific research. The sixty-five articles are annotated with an asterisk in the references portion of the paper.

For the next stage of the review, we inspected the sixty-five articles for cross references among them and we compiled a spreadsheet to capture the number of cross references. Once the spreadsheet was completed, we identified the top cited articles and we reached out to the top five corresponding authors to obtain additional resources. We asked the authors to provide the 5-7 of the most impactful articles and/or books that they have published or come across during their



research. We received a very limited additional suggestion. Lastly, additional sources identified through previous research were included in our entire literature review to compliment the systematic literature review.

The City of Orlando was selected for our case study as steps have been taken by the municipality to become more sustainable. These efforts had been reported through an internal operations plan. More recently, the city created a Community Action Plan. The first edition was released in 2013, prior to the development of the SDGs. The second version was released in 2018, which provided an update on the progress made toward the targets identified in the 2013 version and integrated the SDGs into the action plan. The city received numerous awards for its sustainability initiatives such as Bloomberg awards to combat climate change and LEED gold city.

Within the action plans, numerous stakeholders and community partners were identified. Both plans were very much reliant on input from residents, businesses, community leaders, city staff, nonprofits, government agencies, roundtables, and taskforces. This occurred through online surveys, workshops, and roundtable discussions involving city staff and subject matter experts. The level of commitment and input into the process varied across the spectrum of stakeholders. While the specific input and process was undoubtedly invaluable to the city, this paper sought to identify the individual organizations that were identified in the content of the documents to conduct network analysis to better understand the structure and members of the network. In addition to the community action plans, staff with the city's Office of Sustainability & Resilience conducted interviews on their current efforts and provided other helpful documents or guidance to assist in the overall production of this research. Other supporting documents were gathered in the pursuit of a more comprehensive analysis. A complete list of the documents is in Appendix A.

### **Results**

A thorough analysis was conducted on the secondary sources to capture the organizations that were responsible in the formulation of the community actions plans and other efforts. Each organization identified in the documents was notated, as were the types of interactions and contributions. A complete list of the organizations is located in Appendix B. The network consists of 128 organizations. Public organizations make up roughly a quarter (1/4) of the network, the private sector a little over 31%, and nonprofit organizations at 43% (Table 1).

| <b>Type/Sector</b>    | <b>Number of Organizations</b> | <b>%</b>     |
|-----------------------|--------------------------------|--------------|
| Public/International  | 1                              | 0.8%         |
| Public/Federal        | 7                              | 5.5%         |
| Public/State          | 8                              | 6.3%         |
| Public/Education      | 5                              | 3.9%         |
| Public/Regional       | 5                              | 3.9%         |
| Public/County         | 3                              | 2.3%         |
| Public/City           | 4                              | 3.1%         |
| <b>Public (Total)</b> | <b>33</b>                      | <b>25.8%</b> |
| <b>Nonprofit</b>      | <b>55</b>                      | <b>43%</b>   |
| <b>Private</b>        | <b>40</b>                      | <b>31.3%</b> |
| Total                 | 128                            | 100%         |

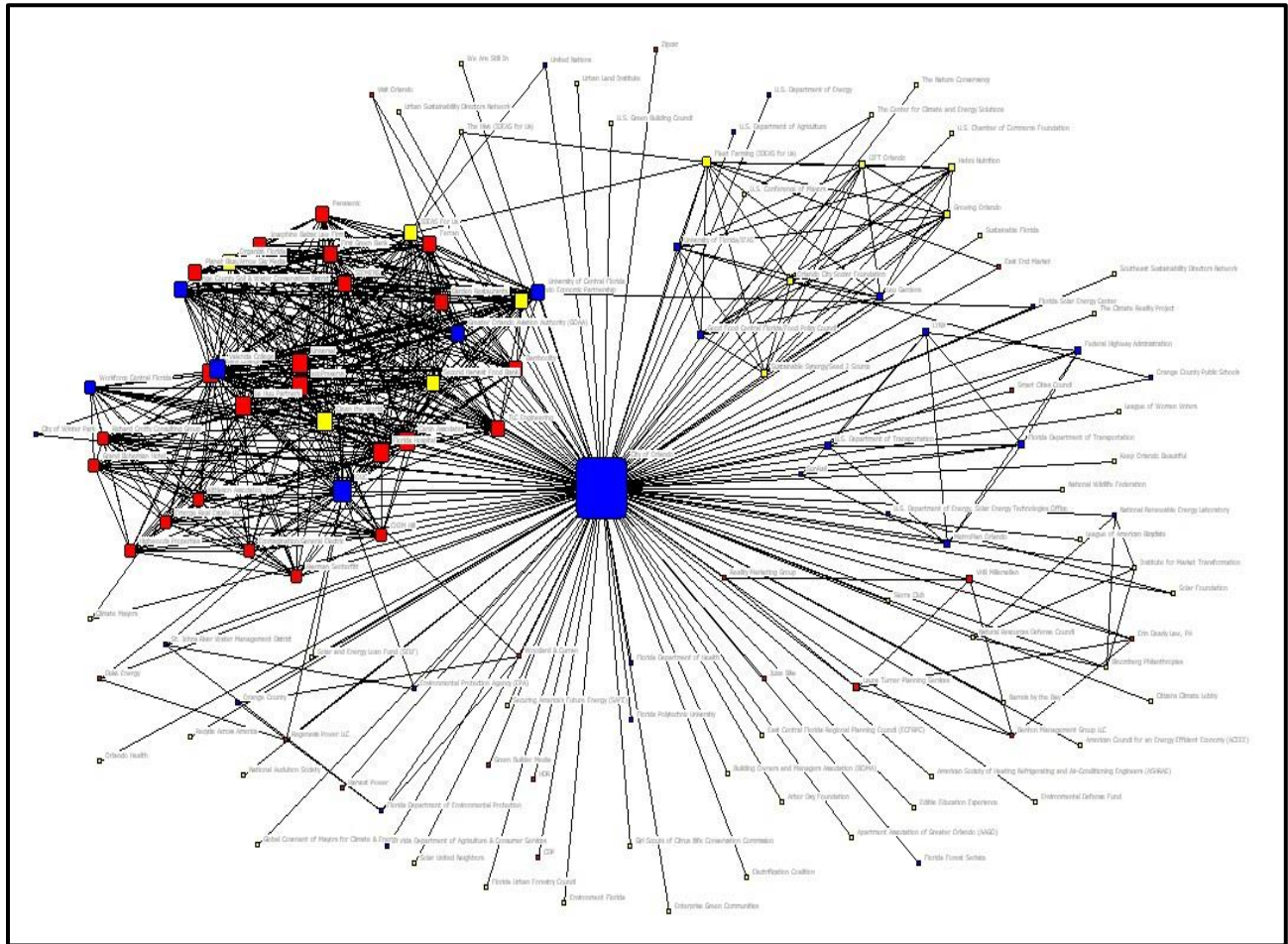
*Table 1.* Organization Type and Frequency

To capture the actors and structure of this network, we created a one-mode adjacency matrix to assess the ties between the organizations. Although some of the organizations are tied directly to the Office of the Mayor for instance, we consolidated this office and other departments of the City of Orlando for consistency purposes. After the matrix was created, NetDraw was used to create a visualization of the network (Figure 1).



Figure 2.

Degree centrality in the interorganizational network



For networks, centralization properties are of primary concern and are viewed as the cohesiveness of a network (Borgatti, Everett, & Johnson, 2017). Cohesion is defined as the connectedness or ‘knittedness’ of a network and the simplest measure is density which calculates the number of possible ties in a network (Borgatti, Everett, & Johnson, 2017). A lower number signifies less cohesion, while inversely a higher number signifies greater connectedness. The calculation for this network is 0.076, indicating a loosely tied network and exhibiting low density.

To further calculate the centrality of the organizations in the network, degree centrality was utilized. This is measured as the number of ties or interactions one organization has with others in the network. Two output measures are produced - the first number, ‘degree’, is simply the number of ties and the second, ‘nDegree’, is the percentage of connections to other organizations within the whole network. The results showed that the City of Orlando had a nDegree score of 1.0 meaning it was tied to every other organizations. Conversely, a handful of organizations had scores of 0.008 on the opposite end of the spectrum. These organizations were connected only to the City of Orlando and would be considered pendants. The remaining

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organizations scored anywhere between 0.016-0.315. The scores indicate that many organizations are tied to others in the network, but at varying degrees and, other than the City of Orlando, the next highest connected organization Orlando Utilities Commission (OUC) is tied to roughly 31% of the organizations in the network. These findings correlate to the low-density calculation previously discussed.

In addition, these finding exhibit subgroups or clusters of organizations within the network. The way in which to classify these subgroups is cliques. A clique is a subset of actors, or nodes, in which each is connected to the others and requires membership of 3 or more actors (Borgatti, Everett, & Johnson, 2017). Evidence of cliques was found in both the calculations and the visualization of the network. Numerous calculations were run to locate the number of cliques present within the network (Table 2).

| Minimum Set Size | Number of Cliques |
|------------------|-------------------|
| 3                | 25                |
| 4                | 13                |
| 5                | 8                 |
| 6                | 5                 |
| 7-10             | 4                 |
| 11-13            | 3                 |
| 14-19            | 2                 |
| 20+              | 1                 |

*Table 2.* Cliques in the interorganizational network

The largest clustering of actors in the top left side in Figure 2 are those organizations that were part of the two task forces that provided input and advice in the creation of the community action plans. Some actors were only part of one task force, while others were part of both. The clique located in the top right are those that have been involved in creation of urban and community gardens and community supported agriculture (CSA). The clique right below this one is the community partners involved in transportation. The clique at the bottom right is the consulting team that worked with the City of Orlando to develop both community action plans. The two smaller cliques located in the bottom left of the graph are those partners involved in energy, water, and wastewater. Table 3 below provides examples of these cliques, the member list of each, and the most prevalent sector(s).

| Focus                                  | Member List  | Most Prevalent Sector(s) |
|--|--|--------------------------|
| 2018 Taskforce (Community Action Plan) | Bamboolity, Canin Associates, City of Orlando Clean the World, Darden Restaurants, ecoPreserve Ferran, First Green Bank, Florida Hospital, Greater Orlando Aviation Authority (GOAA), IDEAS For Us, Josephine Balzac Law Firm, Le Huu Partners, Orange County Soil & Water Conservation District, Organize Florida, Orlando Economic Partnership, OUC, Panasonic, Planet Blue/Arrow Sky Media, Rollins College, Second Harvest Food Bank, SIEMENS, TLC Engineering, Universal, | Private                  |

|                              |  |                   |
|------------------------------|--|-------------------|
|                              | University of Central Florida, Valencia College  |                   |
| Transportation (Safety)      | City of Orlando, Florida Department of Transportation, MetroPlan, Federal Highway Administration, LYNX   | Public            |
| Food (Community Agriculture) | City of Orlando, Fleet Farming, Hebni Nutrition, Sustainable Synergy/Seed 2 Source, Leu Gardens, Good Food Central Florida/Food Policy Council, LIFT Orlando, University of Florida/IFAS, Growing Orlando, Orlando City Soccer Club Foundation | Public/Non-Profit |
| Energy (Solar Expansion)     | City of Orlando, Duke Energy, Regensis Power LLC, OUC  | Public/Private    |
| Water (Conservation)         | OUC, St. Johns Water Management District, City of Orlando, U.S. Environmental Protection Agency  | Public            |

Table 3. Examples of Cliques

### Discussion

The results from the network analysis immediately illuminate the key position of the City of Orlando in facilitating collective action and engagement in sustainability. The City of Orlando, and especially the Mayor and the new office of Sustainability and Resilience, is essential in the network as the key orchestrator and facilitator. As previous research has shown, strong leadership and public official support are intricately tied to the success of such projects and partnerships (Pattberg & Widerberg, 2015; Shi, Chu, & Debats, 2015).

The incentive that appears to have led to higher levels of stakeholder engagement is in encouraging and valuing input from numerous stakeholders. Creation of the community action plans relied greatly on the community engagement process. This was achieved through public workshops and online surveys, focus area roundtables, and community taskforces. As was discovered, the partner mix was not dominated by a single sector and included ample partners from the private and nonprofit sectors, as well as partners at different levels of government. Again, this was discovered in other studies where optimal partner mix, and the engagement and participation of all relevant stakeholders is critical and can be a decisive factor in the success of a project (Pattberg & Widerberg, 2015; Berrone et al, 2019).

The results also showed that the network exhibited low density but contained a few clusters of actors. This should be expected as the SDGs are a new policy domain and cities around the U.S. are in the process of identifying ways to achieve sustainable development and the impacts that stakeholders can have in the process. Within the community action plans, various partners from the different sectors are noted for their commitment to sustainability. This illustrates that the community partners have taken a vested interest in seeing progress made and action is not being taken solely in the public sector realm. Many of the private and nonprofit organizations are well-known and well-established members of the community. Although this paper did not study the actual impacts, actors from all sectors were instrumental in providing advice and contributions in the formulation of the action plans and this may lead to even greater collaboration and action among other organizations in the community acting as snowball effect.

The availability of internal financial resources has been critical for the City of Orlando. However, outside financial assistance has also played a role in the successful implementation of projects. Funding from the U.S. Departments of Agriculture and Energy in the form of grants

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have allowed the city to implement project such as expansion of community gardens, greater building energy efficiency, and expansion of solar technology. In addition, Bloomberg Philanthropies announced in January 2019 that the City of Orlando was a final recipient of the Bloomberg American Cities Climate Challenge, which awarded the city a robust technical support package valued at \$2.5 million to continue to support their carbon reduction efforts (Cochran, 2019).

Additional resources include knowledge and information sharing, and expertise from staff and community partners. The Mayor and staff from the Office of Sustainability and Resilience are part of a variety of outside networks that bring together similar officials from around the country through professional associations and collaborations. Some examples include Climate Mayors, U.S. Conference of Mayors, and the Urban Sustainability Directors Network to name a few.

As part of their commitment to sustainable development, the City of Orlando has also institutionalized procedures and is in the process of integrating different aspects into city ordinances and programs under their purview. As evidence, a chapter within the Code of Ordinances (Chapter 15-Sustainability) deals with energy efficiency and benchmarking of all buildings within the municipality. The city also allows a certain percentage of residential properties to be used for residential gardens and growing produce. To expand this practice, the city is working with the Eastern Central Florida Regional Planning Council to craft an ordinance to expand it to businesses and codify the measure. Lastly, as is standard practice in U.S. municipal governments, the city has extensive oversight over water and wastewater practices outlined in their ordinances.

Programs the city supports in tandem with community partners have also played a key role in achieving buy-in from residents and businesses within the community. These include financial assistance to residents to update their home efficiency and/or use of solar technology. In an effort to also reduce food waste, the city has given out thousands of residential backyard composters and works with partners to divert commercial food waste away from landfills.

An important aspect of the SDGs are the indicators used to measure progress. The measurement of the impacts in Orlando are reported within the appendices of the community action plans. One innovative approach the City of Orlando took was to report how the specific projects and efforts worked toward each of the SDGs. Further, the community action plans were organized by focus areas and the latest version includes seven focus areas: clean energy, green buildings, local food, solid waste, livability, transportation, and water. Within each of these focus areas a 2012 baseline and 2018 data are provided, as well as indicators. These provide explicit evidence of progress made since the earlier version of the plan.

Staff with the Office of Sustainability & Resilience relayed that the next strategy is to obtain certification with the World Council on City Data (WCCD). The WCCD is a global information sharing network that uses standardized data to create smart, sustainable, resilient, and prosperous cities (World Council on City Data, 2020). Data is quantified using indicators from the International Organization for Standardization (ISO), ISO 37120 Sustainable Development of Communities: Indicators for City Services and Quality of Life, which consists of 100 indicators under the three sustainability pillars of economic, environment, and social performance (World Council of City Data, 2020).

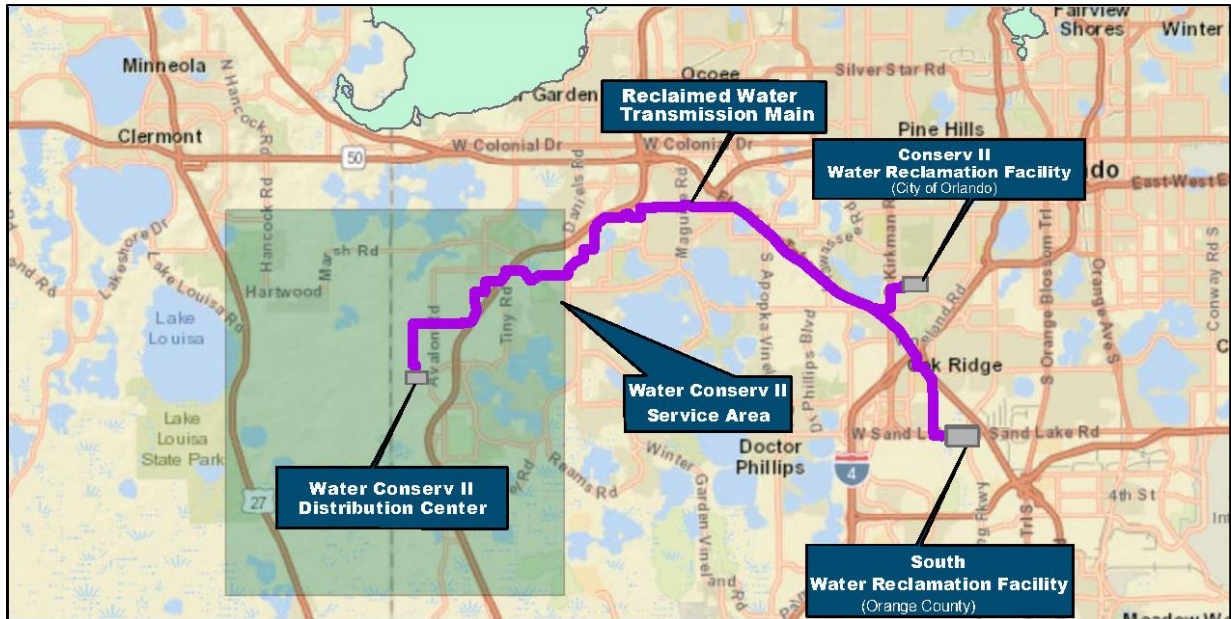


Besides internal measurements, an organization from outside the city provides some additional evidence of the progress that has been made. The American Council for an Energy Efficient Economy (ACEEE) tracks city clean energy policies and progress of 75 cities within the U.S.; and the latest City Scorecard ranks Orlando in the 15<sup>th</sup> position and the highest ranking city in the Southeastern U.S. (American Council for an Energy Efficient Economy, 2019).

The last goal of this study was to determine if FEW projects existed in the community or if anything came close to integrating the resources. After research and city staff consultation, no specific FEW project existed but one particular site was promising. Water Conserv II is an award-winning wastewater treatment facility located outside the city boundaries in West Orange County (Figure 3) and is the largest reuse project of its kind in the world (Water Conserv II, 2020).

Figure 3.

Conserv II - Location and Service Area (Water Conserv II, 2020)



The treatment facility was built in 1984 through a partnership between the City of Orlando and Orange County to expand treatment service and comply with state requirements to eliminate discharge to surface waters (Water Conserv II, 2020). Conservation of water is achieved through agricultural irrigation and aquifer recharge via rapid infiltration basins (RIBs); and it was the first reuse project to be permitted by the Florida Department of Environmental Protection (FDEP) to irrigate crops (citrus) for human consumption (Water Conserv II, 2020). The facility is currently powered by traditional forms of fossil fuels. However, with the recent expansion and focus on solar energy in the community, city staff is now in discussion to offset energy consumption with solar energy technology. The city could also take additional steps to work with partners and energy providers to incorporate biofuels from food or solid waste.



## **Conclusion**

Findings from the study are similar to those addressed by others in the literature. Strong public leadership support and having a key actor orchestrating the process appears to be quintessential. Likewise, financing, input, and knowledge sharing from numerous stakeholders and sectors are necessary. This is achieved through effective network governance of partnerships and stakeholder engagement to build buy-in and collective action, as is a critical aspect of the SDGs. One innovative approach the City of Orlando has taken is incorporating the SDGs into the action plans and using the indicators to track progress toward them. Lastly, the institutionalization of efforts, such as the Code of Ordinances and the Community Action Plan and the creation of permanent office of Sustainability and Resilience, provides strategic direction of the municipality and facilitates the positive trajectory of the community in becoming one of the most sustainable in the U.S.

Similar trends appear likely to continue as evidence from the growing number of municipalities around the globe filing VLRs. Such actions and efforts will be necessary as human migration patterns are increasingly moving toward urban centers and where real progress can be attained within the goals of sustainable development. One limitation of this study is with the analysis of the efforts within one community in an urban area. Each community has its own distinct characteristics that are formed from different demographics, political ideologies, settlement patterns, economic bases, surrounding natural resources, laws, regulations, and climate. Secondly, other partnerships may already exist between these organizations not identified through the selected sources and could be captured with additional sources, analysis, or utilization of surveys and additional interviews.

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**Appendix A: Document List**

*Internal*

2013 Community Action Plan

2018 Community Action Plan

PowerPoint Presentation to UCF Faculty (November 2019)

Municipal Operations – 2016 Progress Report

Charter, Chapter 15 - OUC

Ordinance – Residential Edible Landscapes

Ordinance - Chapter 15 – Sustainability (Building Energy Benchmarking)

Ordinance – Chapter 32 – Reclaimed Water

OUCommunity Solar Program

OUC Solar Projects

Water Conserv II

*External*

Alliance for a Sustainable Future – Mayors Leading the Way on Climate

American Council for an Energy-Efficient Economy (ACEEE) – Orlando 2019 Scorecard

East Central Florida Regional Planning Council (ECFRPC), Regional Resilience Collaborative –  
Announcement & MOU

World Council on City Data (ISO 37120)

*Key forthcoming documents/actions:*

ISO Certification to participate in the World Council on City Data for information sharing

Local Food Ordinance – working with ECFRPC to develop

Sustainable Municipal Purchase Policy

**Appendix B: List of Organization**

| <b><u>Organization</u></b>  | <b><u>Focus</u></b>  | <b><u>Sector</u></b> |
|---|----------------------|----------------------|
| Akerman Senterfitt  | Legal Services       | Private              |
| American Council for an Energy Efficient Economy (ACEEE)                          | Energy               | Non-Profit           |
| American Society of Heating Refrigerating and Air-Conditioning Engineers (ASHRAE) | Association          | Non-Profit           |
| Apartment Association of Greater Orlando (AAGO)                                   | Association          | Non-Profit           |
| Arbor Day Foundation  | Environment/Trees    | Non-Profit           |
| Bamboolity  | Unknown              | Private              |
| Barrels by the Bay  | Water                | Non-Profit           |
| Benton Management Group LLC   | Consulting           | Private              |
| Bloomberg Philanthropies  | Philanthropy         | Non-Profit           |
| Building Owners and Managers Association (BOMA)                                   | Association          | Non-Profit           |
| Canin Associates  | Developers           | Private              |
| CDP   | Marketing            | Private              |
| CH2M Hill   | Engineering          | Private              |
| Citizens Climate Lobby  | Advocacy             | Non-Profit           |
| City of Orlando   | Municipal Government | Public/City          |
| City of Winter Park   | Municipal Government | Public/City          |
| Clean the World   | Health               | Non-Profit           |
| Climate Mayors  | Association          | Non-Profit           |
| Darden Restaurants  | Food                 | Private              |
| Duke Energy   | Energy               | Private              |
| East Central Florida Regional Planning Council (ECFRPC)                           | Association          | Non-Profit           |
| East End Market   | Food                 | Private              |
| Ecomagination/General Electric  | Technology           | Private              |
| ecoPreserve   | Consultants          | Private              |
| Edible Education Experience   | Food                 | Non-Profit           |
| Electrification Coalition   | Transportation       | Non-Profit           |
| Emerge Real Estate LLC  | Housing              | Private              |
| Enterprise Green Communities  | Housing              | Non-Profit           |
| Environment Florida   | Advocacy             | Non-Profit           |
| Environmental Defense Fund  | Advocacy             | Non-Profit           |
| Environmental Protection Agency (EPA)   | Water                | Public/Federal       |
| Erin Deady Law, PA  | Legal                | Private              |
| Federal Highway Administration  | Transportation       | Public/Federal       |

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|   |                            |                  |
|---|----------------------------|------------------|
| Ferran  | Utilities                  | Private          |
| First Green Bank                                      | Financial                  | Private          |
| Fleet Farming (IDEAS for Us)                          | Agriculture                | Non-Profit       |
| Florida Department of Agriculture & Consumer Services | Agriculture                | Public/State     |
| Florida Department of Environmental Protection        | Water                      | Public/State     |
| Florida Department of Health                          | Health                     | Public/State     |
| Florida Department of Transportation                  | Transportation             | Public/State     |
| Florida Fish and Wildlife Conservation Commission     | Wildlife Conservation      | Public/State     |
| Florida Forest Service                                | Trees                      | Public/State     |
| Florida Hospital                                      | Health                     | Private          |
| Florida Polytechnic University                        | Education                  | Public/Education |
| Florida Solar Energy Center                           | Research                   | Public/Education |
| Florida Urban Forestry Council                        | Trees                      | Non-Profit       |
| Good Food Central Florida/Food Policy Council         | Food                       | Public/Regional  |
| Girl Scouts of Citrus                                 | Leadership                 | Non-Profit       |
| Global Covenant of Mayors for Climate & Energy        | International Alliance     | Non-Profit       |
| Grand Bohemian Hotel                                  | Hospitality                | Private          |
| Greater Orlando Aviation Authority (GOAA)             | Transportation             | Public/Regional  |
| Green Builder Media                                   | Media/Marketing            | Private          |
| Growing Orlando                                       | Agriculture                | Non-Profit       |
| Harvest Power   | Food Waste Recycling       | Private          |
| HDR   | Engineering                | Private          |
| Hebni Nutrition                                       | Consultants                | Non-Profit       |
| Highwoods Properties                                  | Property Management        | Private          |
| IDEAS For Us  | Sustainability             | Non-Profit       |
| Institute for Market Transformation                   | Building Energy Efficiency | Non-Profit       |
| Josephine Balzac Law Firm                             | Legal Services             | Private          |
| Juice Bike  | Transportation             | Private          |
| Keep Orlando Beautiful                                | Government Initiative      | Non-Profit       |
| Kittleston Associates, Inc.                           | Transportation Consultants | Private          |
| Laura Turner Planning Services                        | Planning                   | Private          |
| Le Huu Partners                                       | Architects                 | Private          |
| League of American Bicyclists                         | Advocacy                   | Non-Profit       |
| League of Women Voters, Orange County                 | Advocacy                   | Non-Profit       |
| Leu Gardens   | Park                       | Public/City      |
| LIFT Orlando  | Urban Revitalization/Pover | Non-Profit       |

|  |                                    |                 |
|--|------------------------------------|-----------------|
|  | ty Reduction                       |                 |
| LYNX   | Transportation                     | Public/Regional |
| MetroPlan Orlando                                | Transportation                     | Public/Regional |
| National Audubon Society                         | Bird Conservation                  | Non-Profit      |
| National Renewable Energy Laboratory             | Energy                             | Public/Federal  |
| National Wildlife Federation                     | Wildlife Protection                | Non-Profit      |
| Natural Resources Defense Council                | Environmental Protection           | Non-Profit      |
| Orange County                                    | Government                         | Public/County   |
| Orange County Public Schools                     | Education                          | Public/County   |
| Orange County Soil & Water Conservation District | Environmental Conservation         | Public/County   |
| Organize Florida                                 | Community Organizing               | Non-Profit      |
| Orlando City Soccer Foundation                   | Sports Team Foundation             | Non-Profit      |
| Orlando Economic Partnership                     | Economic and Community Development | Non-Profit      |
| Orlando Health                                   | Healthcare                         | Non-Profit      |
| OUC  | Utilities                          | Public/City     |
| Panasonic  | Electronics                        | Private         |
| Planet Blue/Arrow Sky Media                      | Media/Social Enterprise            | Private         |
| Reality Marketing Group                          | Marketing                          | Private         |
| Recycle Across America                           | Recycling                          | Non-Profit      |
| Regenesis Power LLC                              | Energy                             | Private         |
| Richard Crotty Consulting Group                  | Consulting                         | Private         |
| Rollins College                                  | Education                          | Private         |
| Second Harvest Food Bank                         | Food                               | Non-Profit      |
| Securing America's Future Energy (SAFE)          | Energy                             | Non-Profit      |
| SIEMENS  | Electronics                        | Private         |
| Sierra Club                                      | Environment                        | Non-Profit      |
| Smart Cities Council                             | Association                        | Private         |
| Solar and Energy Loan Fund (SELF)                | Financing                          | Non-Profit      |
| Solar Foundation                                 | Energy                             | Non-Profit      |
| Solar United Neighbors                           | Energy                             | Non-Profit      |
| Southeast Sustainability Directors Network       | Association                        | Non-Profit      |
| St. Johns River Water Management District        | Water                              | Public/State    |
| SunRail  | Transportation                     | Public/State    |
| Sustainable Florida                              | Sustainability                     | Non-Profit      |
| Sustainable Synergy, Seed 2 Source               | Food                               | Non-Profit      |
| The Center for Climate and Energy Solutions      | Think Tank/Policy                  | Non-Profit      |
| The Climate Reality Project                      | Advocacy                           | Non-Profit      |
| The Hive (IDEAS for Us)                          | Advocacy                           | Non-Profit      |

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|--|----------------|----------------------|
| The Nature Conservancy   | Environment    | Non-Profit           |
| TLC Engineering  | Engineering    | Private              |
| U.S. Chamber of Commerce<br>Foundation                         | Recycling      | Non-Profit           |
| U.S. Conference of Mayors                                      | Association    | Non-Profit           |
| U.S. Department of Agriculture                                 | Food           | Public/Federal       |
| U.S. Department of Energy                                      | Energy         | Public/Federal       |
| U.S. Department of Energy, Solar<br>Energy Technologies Office | Energy         | Public/Federal       |
| U.S. Department of Transportation                              | Transportation | Public/Federal       |
| U.S. Green Building Council                                    | Buildings      | Non-Profit           |
| United Nations   | Association    | Public/International |
| Universal  | Entertainment  | Private              |
| University of Central Florida                                  | Education      | Public/Education     |
| University of Florida/IFAS                                     | Education      | Public/Education     |
| Urban Land Institute, Central Florida                          | Association    | Non-Profit           |
| Urban Sustainability Directors Network                         | Association    | Non-Profit           |
| Valencia College   | Education      | Public/Education     |
| VHB Millersellen   | Consulting     | Private              |
| Visit Orlando  | Tourism        | Private              |
| We Are Still In  | Association    | Non-Profit           |
| Woodard & Curran   | Private        | Private              |
| Workforce Central Florida                                      | Employment     | Public/Regional      |
| Zipcar   | Transportation | Private              |